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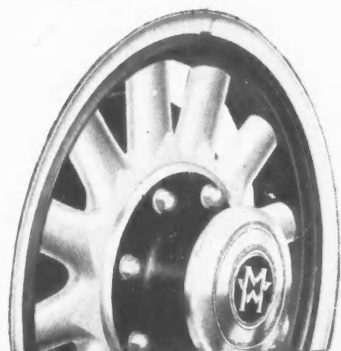
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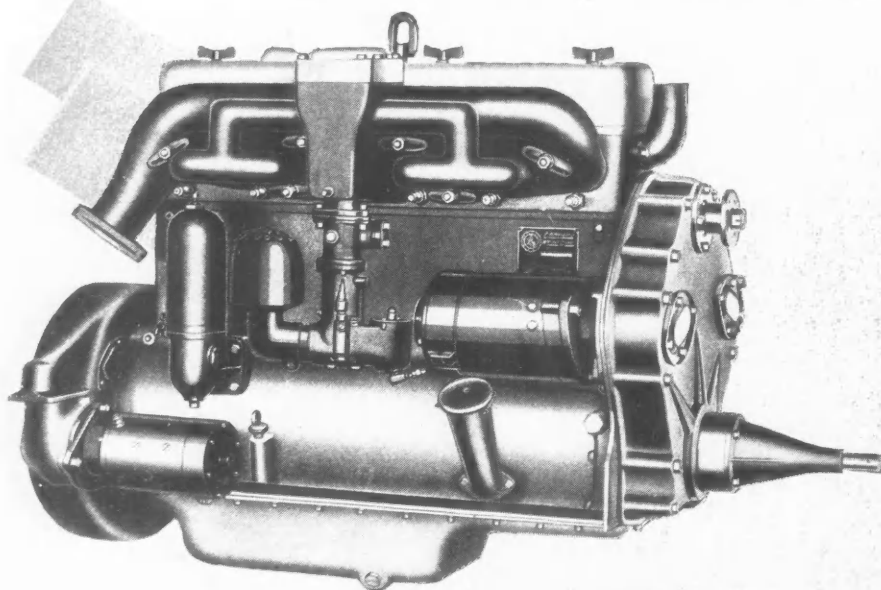
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AUTOMOTIVE INDUSTRIES

THE AUTOMOBILE

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Vol. 60

No. 20

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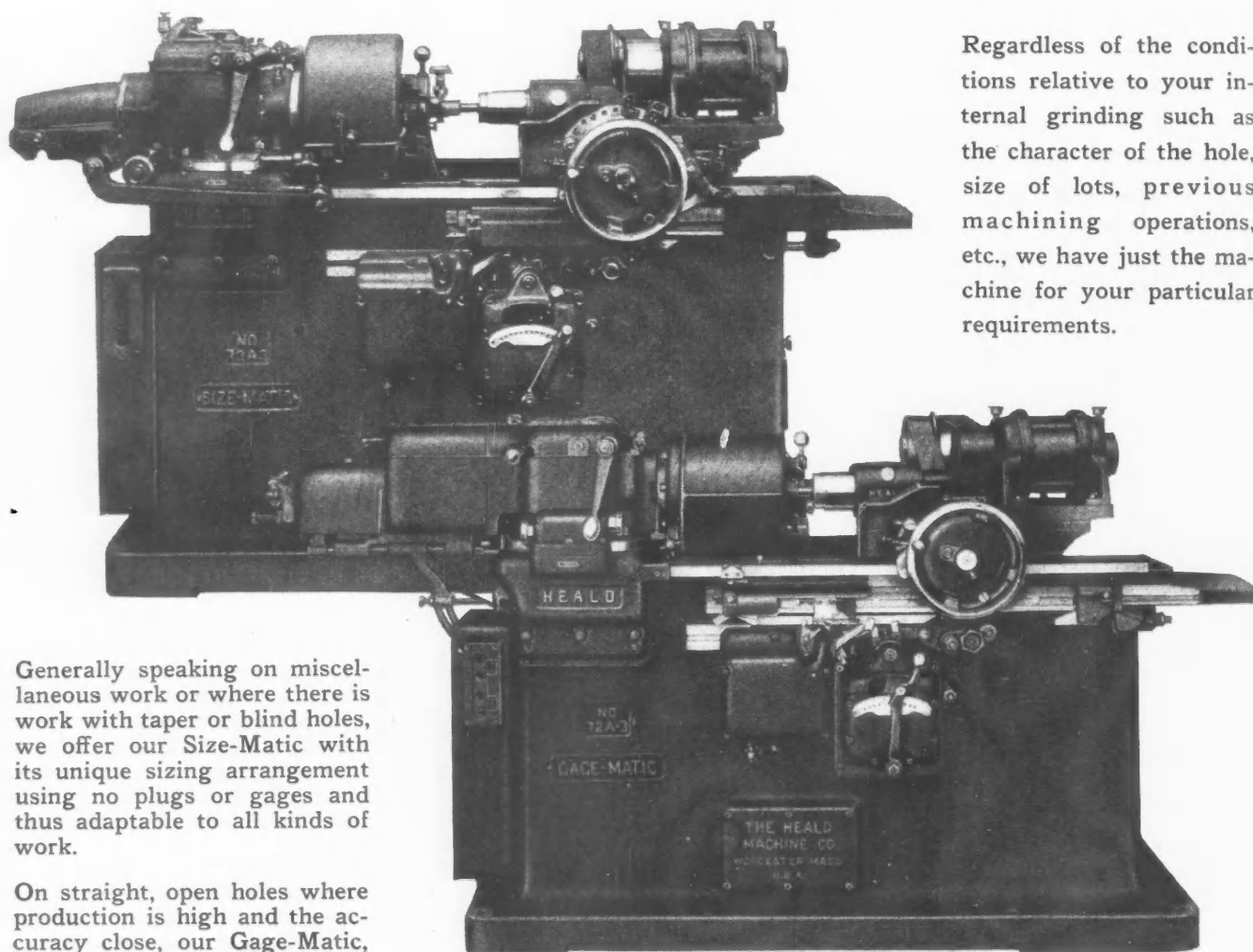
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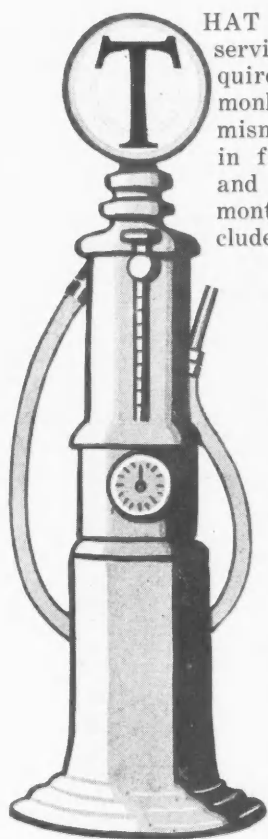
Philadelphia, Saturday, May 18, 1929

NUMBER 20

Super-Service—What Does It Mean To Car Manufacturers?

Term commonly used to describe group of quick, minor, routine services needed regularly by every automobile. Greater dealer activity in such work urged as sales aid.

By NORMAN G. SHIDLE



THAT group of quick, minor, routine services—which every automobile requires regularly and which have commonly come to be grouped under the misnomer of super-service—has come in for much specialized exploitation and speculative discussion in recent months. This group of services includes such functions as sale of gasoline and oil, greasing, washing, brake service, headlight adjusting, wheel alignment, tire repair, battery service, etc.

As car registrations have increased in every community, the possibilities for profit making by retailers from the rendering of such services to car owners have increased. Most car dealers already are set up, in embryo, to perform a majority of these quick, regular minor service functions in addition to regular mechanical overhaul maintenance work. Relatively few of them, however, are so set up as to be able to merchandise and perform these services for the public in price and time competition with numerous small shops, which have grown by specializing on quick service alone.

Should the car dealer bother about that fact one way or another?

Should the car manufacturer care whether or not his dealers bother about it?

Those are questions which are being asked in several quarters and which one school of thought in the industry seems to want to answer rather positively in a generally affirmative fashion. This school feels rather definitely that material advantages may accrue to the car manufacturer who encourages his dealers to develop

these minor service functions for all makes of cars, even though he confines himself to the particular make which he sells so far as major overhauls and repairs are concerned.

The ideas of this group, involving as they do a strong emphasis on service by dealers both from a merchandising and architectural standpoint, would seem to be somewhat at odds with the ideas of some passenger car executives. The importance of the subject, however, in light of current retail merchandising trends, warrants attention and understanding on the part of car manufacturers at this time, whatever may be their reaction to the viewpoint.

Broadly speaking, those in this school of automotive thought, if addressing a group of car manufacturers, probably would say something like this:

"Why don't you urge your dealers, not merely to provide good mechanical service facilities as you have been doing for some time past, but to set themselves up to perform those quick, routine services which every automobile requires regularly? Super-service, this class of work is being called in the last few years, although it really is nothing of the sort; it really consists of those minor services which, in addition to major mechanical maintenance work, completes the service needed by the automobile owner of 1929.

"The big advantage to both dealer and manufacturer would be that scores of owners of competitive cars would be brought daily into your dealer's establishment, exposed to his sales organization and to a view of your cars, and at the same time would be paying your dealer a profit. In view of the time and money you have spent helping dealers to build and maintain prospect files, isn't the idea sound?

"True, hundreds of your dealers already are providing these services. But to do the job of bringing in competitive car owners, of making those owners regular customers and of providing a profit for the dealer, the dealer must be equipped to perform these services and to merchandise them at least as efficiently as any other type of retail outlet in his neighborhood.

"To bring about these desired results your dealer

must do more than merely perform a number of the functions outlined. He must:

"1. Set up his place of business in such a way as to make it easy and comfortable for the car owner to drive in and have the quick services performed.

"2. Announce clearly and forcefully, and so plainly as to be visible to every passerby, that he is equipped and eager to perform those services.

"3. Install efficient equipment and employ personnel to permit him to handle volume and thus make profits at competitive prices.

"4. Perform the services quickly and competently.

"Briefly summarized, such activities on the part of your dealers would probably result in the following advantages to you as a car manufacturer:

"1. Owners of competitive cars would be brought regularly into the place of business of your dealer. They are automatically exposed to the eye appeal of your car and to the sales efforts of your dealer.

"2. Owners of your own make of car automati-

cally would be in more regular contact with your dealer, thus giving him a better opportunity to satisfy small irritations before they grow into major angers.

"3. Your dealer would be provided with another regular source of income, whether car sales are good or bad; he would be better able to cooperate with you in the handling of the various difficulties which constantly arise during feast or famine periods of new car stocks.

"4. 'Super-service' activities are good feeders to major repair jobs. By helping the dealer to keep his shop busy and his service profits up, they aid in providing you with a more firmly financed, and a more permanent retail outlet.'

"5. By acting as feeders to major repairs work by your dealer, super-service activities also help indirectly to increase your sales of parts."

Having thus stated their case, the advocates of this sort of activity on the part of car dealers might go on to cite a number of examples of car dealers who had gained definite profit for themselves and increased car sales for their manufacturers by merchandising and performing this quick type of service function.

Merchandising trends are changing too rapidly today to permit great positiveness about the entire soundness of the thinking expressed in the previous paragraphs. That the ideas should have active, immediate consideration by passenger car sales executives, however, can scarcely be doubted. *Automotive Industries* would like to hear what any factory executive thinks about the matter.



Those car dealers with service fronts such as pictured herewith offer silent invitations to owners of competitive makes to drive into their places of business, and contact with their organizations

Allis-Chalmers High Speed Tractor To Be Produced in Near Future

Light model to be built for recently formed United Tractor and Equipment Corp. It will be priced at \$895 and will be adaptable to farm and industrial work.

PRODUCTION of a new light, high-speed farm and industrial tractor, to list with all accessories at \$895, f.o.b., for the recently formed United Tractor & Equipment Corp., will be begun in the near future by the Allis-Chalmers Manufacturing Co. of Milwaukee, a member firm.

Part of the specifications on the new job are available. The tractor will be able to pull three 14-in. plows, operate a 28-in. separator, a 12-ft. combine, an 8 ft. one-way, disk harrow, a four-row lister, or other smaller implements in tandem.

In addition to the standard equipment, including front-wheel guide rims and either angle cleats or spade lugs for the rear wheels, pneumatic rubbered-tired front and rear wheel equipment will be offered at extra cost for industrial use. The company will guarantee the tractor to deliver a 3000 lb. drawbar pull in low gear and 2500 in second.

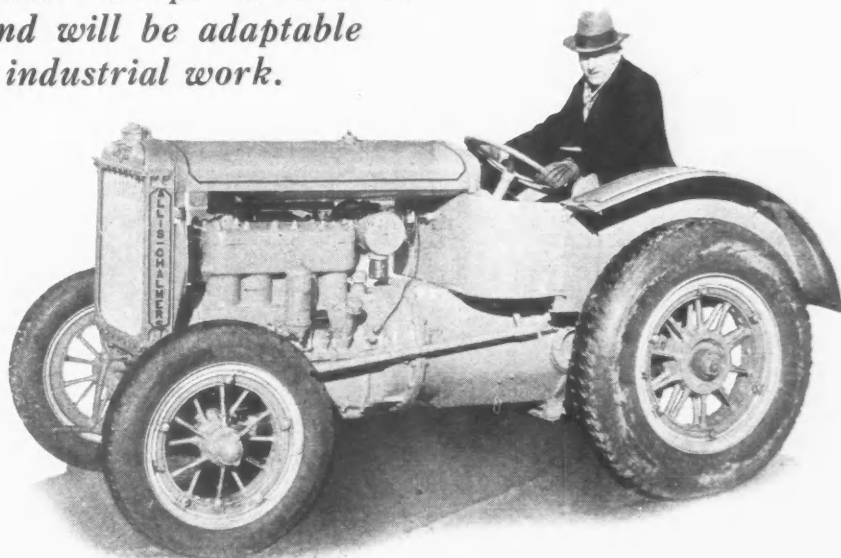
One of the outstanding features of the new machine, in addition to the low price, is the use of a four-speed forward transmission, giving speeds of 2 1/3, 3 1/3, 5 and 10 m.p.h. at normal governed engine operation. Any speed from 1 1/2 to 10 m.p.h. is available by governor regulation. The shipping weight of the tractor is 4125 lb.

The engine is built by the Continental Motors Corp. to special United specifications; it has four 4 1/2 x 5 in. cylinders, giving a piston displacement of 284 cu. in., alloy iron is used for the cylinder block.

The statically and dynamically balanced crankshaft is mounted on three main bearings, all of which are bronze-backed and babbitt-lined, and the middle and rear of which are interchangeable. The front main bearing has a diameter and length of 2 1/4 x 2 3/8 in., the two others being 2 1/4 x 3 in. The pistons are constructed of gray iron and fitted with three rings. The piston pin floats and is 1 1/2 in. in diameter.

Connecting rods are drop-forged, heat treated I-beam sections, 10 1/2 in. from center to center. Valves have a diameter of 2 in. and silchrome and nickel steel are used for the exhaust and inlet respectively. The tappets are of the mushroom type and removable.

Pressure lubrication is provided for all main and connecting rod bearings, piston pins and governor. A pres-



New Allis-Chalmers agricultural and industrial tractor

sure gage is mounted on the engine block. All wheels, steering mechanism and other moving parts, aside from the differential and transmission, are fitted with Alemite-Zerk attachments, and a grease gun goes with the tractor as standard equipment. A Purolator also is included.

Fuel is fed by gravity from a 24-gal. tank located above the engine. A sediment trap is provided. The carburetor is a 1 1/4 in. Kingston and is under governor control. The governor, of the centrifugal type, built-in, operates in a bath of oil. A speed regulator is located on the dash, so that the operator may change engine speed at will. An air cleaner is fitted.

Water is pump-circulated throughout the 5-gal. cooling system. The radiator is of the fin and tube type, and the 20 in., four-blade fan is mounted on Timken roller bearings.

An American Bosch magneto, dust and water-proof in design, and fitted with an impulse starter, supplies ignition. A switch is provided on the dash. The clutch is a 12 in. multiple dry disk.

An automotive unit-powerplant type transmission is used. Gears are of forged alloy steel, carburized and heat-treated. All bearings in the transmission are either ball or roller. The differential is of the four-pinion type and mounted on Timken roller bearings.

The steering gear is of the semi-reversible type, provided with an 18-in. wheel. Turning radii are 14 1/2 ft. outside and 8 ft. inside. The front axle is an I-section drop-forging and is fitted with Timken roller bearings on the drop-forged spindles. The rear axle is of the live type and the shafts are mounted on roller bearings at both ends.

Engine-Operating Conditions on Rail Termed *Almost Ideal* for Service

Powerplant is designed for long life, many being operated as far as 120,000 miles between overhaul periods, Charles

O. Guernsey tells Milwaukee Section, S. A. E.

THE use of rail cars and other internal-combustion-engine equipment by the railroads is growing rapidly, according to Charles O. Guernsey, chief engineer, Automotive Car Division, the J. G. Brill Co., Philadelphia, who recently presented a paper on the subject of Rail Cars before the Milwaukee Section of the S.A.E.

Mr. Guernsey said no one type or size of equipment will meet all of the different requirements, and this brings up the question of rating. He discussed this at some length and then proposed that the engine be rated at a speed which the manufacturer is prepared to guarantee for continuous duty, and that it be rated at 90 per cent of the power which it delivers on test at this speed. Experience has shown that a well-designed engine can be kept up to 90 per cent of its maximum power when new, throughout its life, without an excessive amount of maintenance. This practice has been followed by the Brill company for several years and has proved entirely satisfactory.

The author pointed out that while rail cars are being built with both mechanical and electric drive, all rail cars now being built for use in this country with engines of 200 hp. and over are fitted with electric drive. Most of the rail cars with smaller engines and with mechanical drive are built for export. Mechanical drive can be used for larger powers than 200 hp., but the electric drive is preferred because of its flexibility.

Engine-operating conditions on rail cars with electric drive are almost ideal. The engine is housed in the car body, and, in a modern car, can be kept warm at all times, so that the problem of starting from cold—which is the cause of much wear and tear in other applications—does not arise.

Lubricating oil can be cooled by an interchanger connected into the return pipe from the radiator to the engine, and thus can be maintained at substantially a uniform temperature. This temperature should be high enough to drive off dilutents, but not high enough to

cause oxidation. Very satisfactory results have been obtained where the oil was kept at between 150 and 170 deg. Fahr. If the correct water temperature is maintained and a heat interchanger is used, this follows automatically. This method is considered preferable to that employing an air-cooled oil cooler, as with the former the oil can be maintained at the proper temperatures without additional apparatus.

The application is ideal also because the carburetor air intake is relatively clean. The powerplant is subject

to less vibration than is the case in industrial, motor truck or tractor applications. Moreover, the engine drives a generator, which in turn drives electric motors, thus giving an elastic connection between the engine and its ultimate load, with the obvious advantage of freedom from torsional shocks. The engine is required to operate at wide open throttle only at its designated speed.

The above conditions are helpful in obtaining long and satisfactory operation of these engines between overhaul periods. In many respects, however, this service is extremely severe. The engines are expected to operate for long periods between overhauls. The Brill Co. has set as a goal 6000 hours, which is equivalent to about 150,000

miles, or about two years' service. Many engines are being operated as much as 120,000 miles between overhaul periods, and a considerable number for longer periods. They are operated at a comparatively high load factor.

By comparison with other engines of similar size, such as marine engines, rail car engines operate at considerably higher water-jacket temperature, and the cooling must, therefore, be extremely well worked out.

They must be designed for long life, so that minimum damage will be done by abuse, and so that they can be maintained at the minimum of expense. They should be capable of operating from 25,000 to 30,000 miles, or about 1000 hours, between valve grindings.

Some of the points in design which seem to be neces-

Railcar Fields

RAILCARS are being used to advantage in seven classes of service, according to Charles O. Guernsey, of the J. G. Brill Co. He discusses railcar operating conditions in the accompanying article. The seven classes of service are:

1. Branch line passenger, baggage, express and mail service.
2. Local main-line service requiring trains consisting of from one to five standard coaches.
3. De luxe express services where trains are limited to three or four cars.
4. Milk-train service.
5. Local freight service on light lines.
6. Mixed train service on light lines.
7. Both light and medium switching service.

Cars With Electric Drive

sary to meet the above conditions are:

1. The combustion chamber, valves and pistons must be thoroughly cooled. This points to the use of aluminum pistons, carefully designed combustion chambers, extremely good circulation of water around the combustion chambers, and, in the case of engines of over 5-in. bore, to the use of twin exhaust valves. This point seems to be particularly important. The cooler the exhaust valves can be kept, the longer will be the time between regrinding valves. Also, the cooler these valves can be kept, the higher the compression can be run, other things being equal, and consequently the higher the power which can be taken from the engine. The heat of the valve head is taken primarily through the seat and, obviously, the greater the distance from the center of the head to the seat, the hotter will be the center of the valve head. Furthermore, the area of the valve head exposed to heat goes up with the square of the diameter, whereas the cooling surface increases only in direct proportion to the diameter. Therefore, the smaller the valve, the more will be the cooling surface on the seat in proportion to total exposed area.

It has been demonstrated that engines with twin valves can be operated without detonation at mean effective pressures well above 100 lb. per sq. in., whereas an engine of the same size and having otherwise the same general characteristics of combustion chamber, but with a single exhaust valve, would detonate severely at much lower ratings. The regrinding of exhaust valves is usually the determining factor in removing a car from service, and for that reason, if no other, it is particularly important that the longest possible valve and valve seat life be obtained. The use of twin valves is a very important factor in achieving such a result.

2. Considering overhead-valve-type engines, which generally have been employed in this field, the use of twin intake valves fits well into the design and makes for interchangeability between the intake and exhaust valves. It also makes possible a considerably greater intake valve port area, with a reasonable lift, than is possible with one large valve. While this is not so important as having twin exhaust valves, it does, nevertheless, work into the design extremely well and has advantages making such a construction well worthwhile.

3. The use of a proper oil filter is extremely important. If a good oil is used and is maintained at the temperatures recommended elsewhere in this paper, the matter of oil changing becomes purely a matter of contamination or dirt, rather than a question of dilution, assuming gasoline to be used as a fuel. Therefore, the more perfect the filter that is used in the lubricating system, the longer the lubricating oil can be used without change. One of the most satisfactory consists of

a series of felt stacks, filtering the oil edgewise through felt washers, and in this way removing all but the very finest particles in suspension. With the use of such a filter, satisfactory results without change of oil have been obtained over a period of years, with the oil changed on a schedule of every 4000 miles. If, on the other hand, the oil temperature is low or extremely high, or if an adequate filter is not used, it may be necessary to change the oil after a period of as short as 500 miles, particularly when burning distillate without heat.

4. The weight of the engine should be kept as low as consistent with the above requirements as to life. Life should not be sacrificed to achieve low weight. Good designs in general use at the present moment, however, weigh about 15 lb. per service r.h.p.

5. The engine should be designed for the highest compression and highest mean effective pressure which it can be depended upon to deliver smoothly and without trouble from detonation and related causes, as obviously the higher the compression and the higher the mean effective pressure the higher will be the power output, but more important, the higher will be the fuel economy. This requires, however, the use of careful design throughout, and does undoubtedly increase the per pound or per hp. cost of building the engine.

6. The ignition should preferably be of the magneto type in duplicate, so that if for any reason one magneto fails the other will enable the operator to complete the run. This is preferable to battery ignition principally because the voltage available in the primary battery ignition circuit will vary between 14 or 15 volts when cranking the engine on a cold morning, and 45 to 50 volts if the battery is being charged at a high rate.

7. On six and eight-cylinder engines, multiple carburetion gives best results, both as to economy and power. An important detail is to avoid siamesing the ports on adjacent cylinders, particularly on eight-cylinder engines, as due to the firing order, uniform mixtures will not be delivered to adjacent cylinders thus ported.

8. The cooling system should be so designed that the car will cool equally well for both directions and equally well at all car speeds. Preferably, the air circulation for cooling should be handled by forced draft, and the fan should be electrically driven, with variable speed control so that the fan can be regulated to suit atmospheric temperatures, and need not thereafter be altered if the cooling system should be so arranged that all water is automatically drained inside the car whenever the engine is shut down. This makes it unnecessary to drain the system, as cooling water can be kept warm during layover periods by the use of the car heater.

9. The exhaust gases should be so discharged that

Electric Drive Usage

THE author points out that, while railcars are now being built with both mechanical and electric drives, railcars for use in the United States, with engines of 200 hp. and over, are fitted with electric drive only. Mechanical drive can be used with engines of more than 200 hp., but electric drive is preferred because of its flexibility. Mechanical units are exported.

they will not be drawn into the car windows. This can be satisfactorily done by causing the exhaust gases to be driven upward by the discharge of the cooling fans.

10. For reasons of safety, the fuel feed should be by means of a pump, vacuum system or other similar device, owing to the fire hazard incident to the use of gravity or pressure systems.

In their essentials, the various electric transmissions are all alike. In each case, the engine drives a direct

from series to parallel connections of the motors can be made without closing the engine throttle. This can be done also with *K* control, if it is skillfully handled, but it is the general practice to close the throttle when making the changes with *K* control.

The function of the electrical transmission obviously is to transmit the full power of the engine to the wheels at all times, regardless of car speed, motor connections, or other conditions outside the engine. With differential control of the generator field, as generally used up to the present, the inherent characteristics of the generator and of the traction motors prevent full utilization of the engine horsepower at all times, although it does approximate it.

Curve A in Fig. 1 indicates the full power of a 600-hp. engine in terms of tractive effort against speed, disregarding losses in transmission. Curve B indicates the power which would be delivered to the wheels allowing for electrical losses, but assuming full utilization of the engine. Curve C indicates the amount of power actually delivered to the wheels on a typical differential control electric transmission. The combined efficiency of the generator and motors is practically as high as can be expected, but the space between lines B and C indicates that a material increase in utilization is possible at certain points. This point is brought out even more forcibly in Fig. 2 in which the horsepower is plotted against miles per hour.

Utilization of Power

With full utilization of the engine, an average of about 77 per cent of the engine horsepower is delivered at the rails during acceleration from 5 to 60 m.p.h. The performance below 5 m.p.h. can be improved slightly with full utilization, but is relatively unimportant due to the short space of time that the operation is within this zone. With the differential control equipment, as per the example given, the average utilization is 68.5 per cent. This does not necessarily mean that there would be 8.5 per cent difference in schedule performance, as during the bulk of the time the operating speed would be somewhere between 25 and 60 m.p.h. Even under such conditions, however, there is a marked improvement, probably amounting to 5 per cent.

The steam locomotive is essentially a comparatively

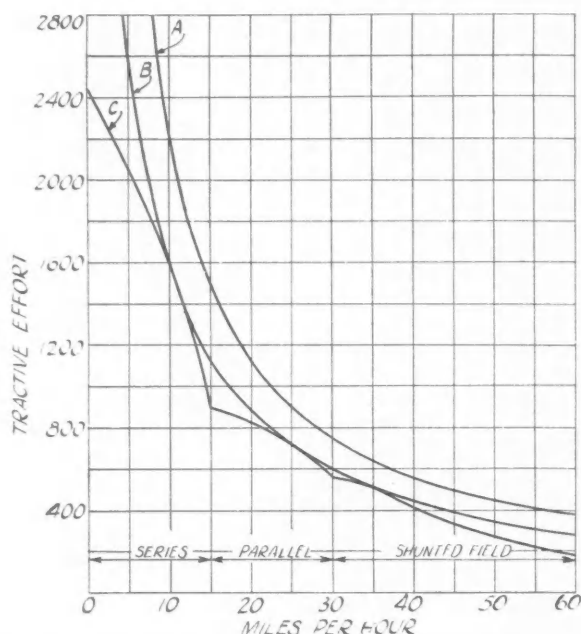


Fig. 1—Tractive effort plotted against car speed.
A—available engine power (600 hp.); B—horsepower available at rail with full utilization of engine power;
C—horsepower available at rail with differential control.

current generator, which in turn transmits power to one or more series motors. The variation between different systems comes in the means of handling the accessories, the generator control, and the switch gear for properly connecting the traction motors, i. e., to say, reverse or forward, and series, parallel or shunted field connections of the traction motors.

In the matter of motor connections, the simplest scheme is the so-called *K* control, in which the operator manually moves a controller, setting up power circuits in the proper fashion directly. This has been used particularly where low first cost was important. In the other system, the motor connections are handled by contactors remotely controlled from the operator's position. This type of control is universally used where heavy currents are to be handled, as, for instance, in electric locomotive applications. It has the disadvantage of somewhat higher first cost and somewhat more complicated wiring diagram, but has advantages in that the 600-volt current can be kept entirely away from the operator, and further in that contacts are made or broken at high speed and are maintained under high pressure, thus reducing the tendency to burn. Both systems have given good results.

Remote Control Favored

With the trend to constantly increasing horsepower, the contactor or remote type will undoubtedly gain favor for the reasons given. This arrangement has a further advantage in case of double-end control or double-powerplant cars, in that the heavy current carrying cables need not be carried throughout the length of the car, as is the case with *K* control. This equipment has a further advantage in that the change

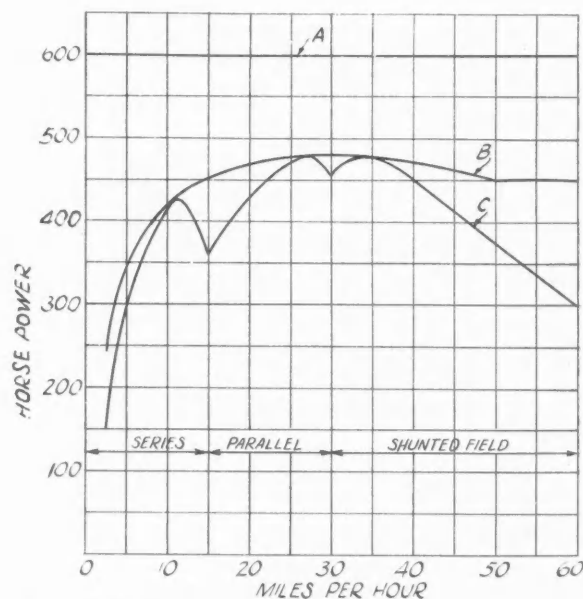


Fig. 2—Horsepower plotted against car speed.
A—available engine power (600 hp.); B—horsepower available at rail with full utilization of engine power;
C—horsepower available at rail with differential control.

simple machine. In recent years, however, these locomotives have been fitted with super-heaters, feed water heaters, boosters and numerous other accessories to increase their effectiveness. Rail cars must necessarily follow the same general line of development, particularly if the added efficiency can be obtained without added complication. In the case of the illustration given last, a 550-hp. engine will perform the same schedule, approximately, at least, with full utilization, as a 600-hp. engine with the utilization as indicated by Curve C. Further, and also important, since the engine would be working somewhere near its point of maximum efficiency, the fuel consumption would be less.

Rail cars ordinarily are and rightly should be applied in such a way that there is a reasonable margin of power for making up delays, or for operating under adverse conditions. As a result, on the normal schedule they are often operated at considerably less than their full rated speed and power.

Fuel Consumption

The fuel consumption per hp.-hr. of a well designed gas engine is at a minimum when operating at its rated speed and power. The fuel consumption does not change materially if the speed is reduced, but the power is maintained substantially in proportion to the reduced speed. In other words, the engine is most efficient if operated wide open or thereabouts, regardless of speed. However, it is not desirable to load the engine to its full torque at speeds less than full speed, for maintenance reasons. It is equally undesirable to operate the engine at too low a load factor, as the fuel consumption is then extremely high. The best application is that which at any given engine speed loads the engine to the maximum torque which it can carry smoothly and without detonation or other unsatisfactory performance at that speed.

Fig. 3 indicates by percentage the horsepower and torque developed by a typical engine. The horsepower developed on test may be considered as 110 per cent of the r.h.p. The engine should then be capable of continuous operation without damage or excessive maintenance at 100 per cent of the service rating and at 100 per cent speed. The governor should be capable of cutting off the engine at a speed slightly above its rated speed, illustrated in this case as 105 per cent of rated speed.

A series of tests have been run to determine the desirable loading when operating at reduced speeds. This is found to be a straight line extending from no horsepower at the idling speed of the engine to full service rating at 100 per cent speed. Any electrical control arrangement which causes the engine to be loaded materially above this line will give very good fuel economy, but to the detriment of engine life. If, on the other hand, the electrical control scheme is such that the loading is materially less than the line shown, then the efficiency when operating at reduced engine speeds will suffer materially.

Ideal Load Line

While this desired load line is offered as an ideal, it has, nevertheless, been very closely approximated and with marked economy as compared to the usual differential control plan.

The ideal electric transmission system, therefore, from the standpoint of utilization, is that one which will utilize the full power of the engine within all car operating speeds, at the engine's rated speed, and which will give loading when operating at reduced engine speeds along the lower line of Fig. 3. Such an arrange-

ment has been made and found entirely satisfactory. It also has numerous other incidental advantages in that it materially simplifies the main generator, allowing the use of a single shunt field without an exciter, as compared to present practice, which requires an exciter having at least two fields and a main generator having two and sometimes three fields.

Accessory Devices

Ordinarily, various accessory devices, such as battery, exciter fields, car fans, car lights, air compressors, etc., must be supplied with 32-volt current. With equipment as generally used heretofore, this has been supplied, although rather imperfectly, either from the main generator or from the exciter. By reason of the characteristics of the differential control machine, the exciter is inherently a variable voltage machine, and, therefore, scarcely suited as an ideal source of 32-volt current for accessory purposes. If, on the other hand, the exciter

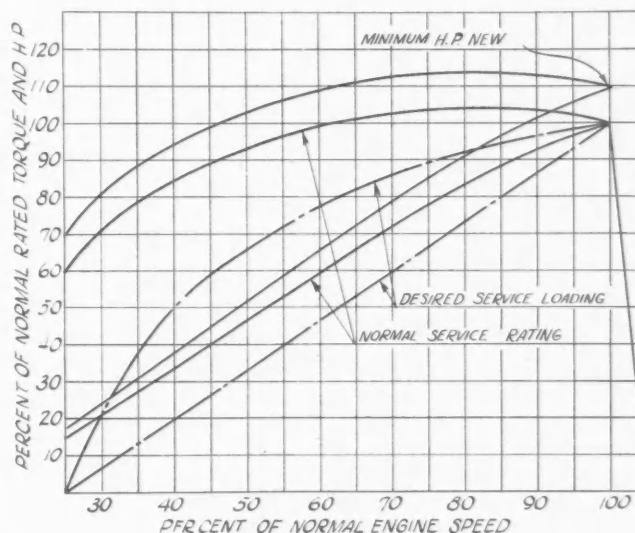


Fig. 3—Engine torque and horsepower plotted against engine speed on a percentage basis

is made a constant voltage machine, it is only capable of delivering its full voltage when operating at two-thirds of rated speed or higher, unless it be made extremely large, which introduces prohibitive costs.

It is extremely important that the battery be kept in good condition, as the whole performance of the car depends upon it. In spite of auxiliary starting devices, such as compressed air, the engine must after all be started, as, for instance, after an overnight layover, by using the battery as a source of power.

Also there are many conditions where it is necessary to maintain air pressure for braking purposes, where otherwise the engine would not be needed. With the typical differential control it is necessary in such cases to disconnect the traction motors from the circuit and speed up the engine for the purpose of supplying the 5 or 6 hp. necessary to operate the air compressor. This obviously is objectionable from the standpoint of wear and tear, to say nothing of fuel economy, but the most serious objection is that the operator must willfully perform certain functions to insure an adequate supply of air for the safety of his train.

In view of the above requirements as to battery charging and air compressor operation, arrangements have been made whereby these functions can be handled from the main engine while idling. A number of such equipments are in service and represent a distinct improvement in respect to these accessories over previous practice.



View of straightaway on roof-track of Fiat plant

Fiat Has Unique With Race-Track

*Car production, starting on the
five stories, ending in a
completed chassis*

By W. F.

FIAT'S place in the European auto
in an up-to-date article by one
AUTOMOTIVE INDUSTRIES, W. F.
ever-increasing interest and activ
ecutives in the field of the Euro
attraction to this article. Sim
within recent weeks in this
history, plants and produc
Citroen and

EXCLUSIVELY an automobile concern when it was established in 1899 with 50 workmen, a motive force of 36 hp. and a plant covering an area of only 32,000 sq. ft., Fiat's activities can now be designated only by the adjective "automotive." Senator Giovanni Agnelli, still the president of the company, had with him as his associates at the origin of the Fabbrica Italiana Automobili Torino—which later became known only by the initials of these four words, FIAT—two men of exceptional ability, Engineers Marchesi and Fornaca.

There was little to indicate that this small automobile company would become one of the most powerful in Europe and a prominent factor in world markets, for in Italy, with no natural resources, and with the local market very restricted, conditions were decidedly against the creation of a big automobile business. Active participation for nearly twenty years in races and competitions in all parts of the world has helped to establish the reputation of the company and make its name known. The racing program, however, never has been looked upon as anything more than a means to an end, and always has been subservient to technical development and has been followed up by a sound production and commercial campaign.

At the present time, Fiat is capitalized at 400,000,000 lire. The company employed 28,396 persons in February of this year and the total area of its main and controlled establishments is more than 204,000,000 sq. ft. If its output of cars is not the highest in Europe, it can claim to be the largest automotive company on the Continent, and it is one of particular interest because of the environment in which it has been developed.

Fiat has fifteen main divisions, each one self-contained, autonomous and responsible only to a central governing body. The divisions are: (1) Automobile section, (2) truck and coach section, (3) custom body-building section, (4) agricultural tractor section, (5) military tank section, (6) aviation engine section, (7) airplane section, (8) Diesel engine section, (9) railroad rolling plant, (10) small arms section, (11) ball and roller bearing section, (12) steel works and rolling mills, (13) iron foundry, (14)

heavy engineering section, and (15) fire engine and industrial motor section.

Auxiliary organizations in which Fiat has important, or controlling interests, are S.A.V.A. a finance company for time sales; S.I.T.A., a company operating coaches and buses; a navigation company at Genoa, and the Marelli Magneto Co., at Milan. As Italy possesses no coal, the Fiat organization could never have been developed without abundant hydro-electric power. This is obtained from the Mont Cenis hydro-electric plant, which is capable of developing 57,000 kilowatts, equal to more than 75,000 horsepower, with an average annual production of 150,000,000 kilowatts. This power is produced by the Societa Idroelettrica Piemonte, and is distributed by other companies. While Fiat has only part interest in these electrical companies, it has assisted in their development as an essential factor in its own progress, for electric current is its only source of power, lighting, electricity, and heat for the furnaces and heat-treating processes.

The center of Fiat's activities is the Lingotto plant on the western edge of the City of Turin. After a



Senator Giovanni Agnelli,
president of Fiat

Plant at Turin Roof for Tests

*first floor, progresses upward
trial road run of each
atop the building.*

BRADLEY

*motive industry is presented herewith
of the European correspondents of
Bradley, of Paris, France. The
ities of American automobile ex-
pean industry should give added
ilar discourses have appeared
publication concerning the
tion operations of Opel,
Ford in Europe.*

rapid but normal growth, war activities caused such an increase in Fiat production that the original factory buildings became totally inadequate, and the decision was made in 1915 to build an entirely new factory, completed in 1923, which is said to be the largest in the world under one roof, and of such size that it will meet all requirements for many years to come. It is the only factory in Europe not having grown by the process of additions. It was designed and constructed as a self-contained unit, and nothing has had to be added to it that was not provided for in the original plan. The plant is of armored concrete construction. There are two parallel buildings, each 1664 ft. long and 80 ft. wide, united at their extremities and also by three transverse buildings housing elevators, staircases and cloak rooms, and serving as passageways on each floor between the two main parallel buildings. The height of the building is 104 ft., and its total area 1,646,418 sq. ft. The five floors are used for automobile construction; the roof is a chassis test track hav-



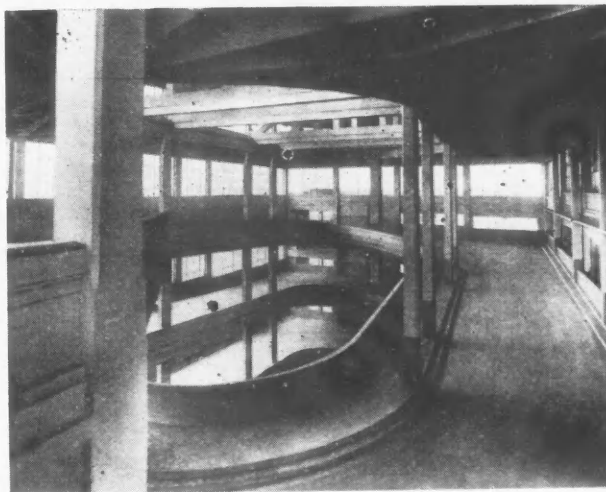
High speed banked turn on test-track

ing the two ends banked sufficiently to assure a safe speed of 65 miles an hour.

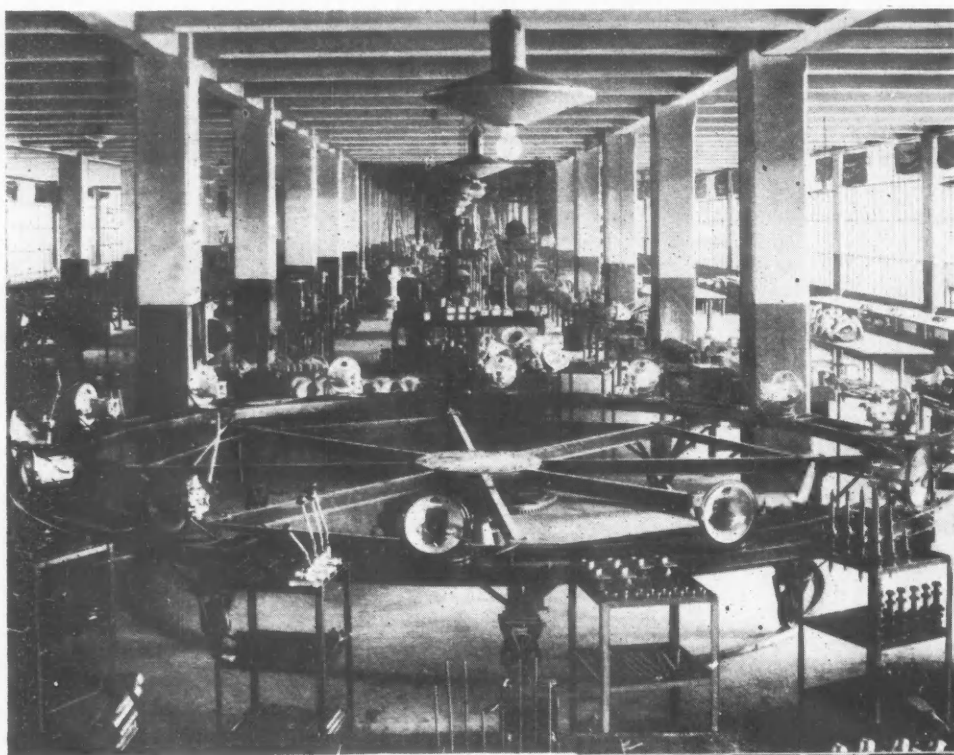
Built across the northern end of the building is a six-story structure, 519 ft. long, 362 ft. wide, containing a spiral ramp giving access to the roof track and each of the floors, and used for the most part for packing and shipping. Added to this is a smaller building, partly four stories and partly five stories in height, with a length of 62 ft. and a width of 190 ft. At the southern end is a similar building, six stories high, also containing a spiral roadway having a length of 666 ft., a width of 80 ft., and a height of 104 ft. Beyond this are the forges, one story in height. The total floor area of this building is 769,545 sq. ft., giving a total floor area for the Lingotto works of 2,415,963 sq. ft.

Parallel with the main factory buildings, fronting on the Via Nizza, the main road from Turin to Nice, is the six-story office building. Opposite the office buildings are railroad sidings connecting with the main Italian State line. Raw materials are unloaded directly from the railroad cars into the factory, and finished and boxed automobiles are loaded direct onto freight cars within the factory itself. Supplies of crude oil for heating, gasoline, etc., are kept in underground tanks on the railroad side of the main building and delivered under pressure to the furnaces or to supply tanks.

Lingotto produces complete passenger cars, including bodies. The models in regular production are the 509, a four-cylinder job of 60.4 cu. in. piston displacement and a wheelbase of 110 inches; model 521, a six-cylinder, L-head job of 138 cu. in. and a wheelbase of 114 inches, and model 525S, built in two chassis lengths and having a piston displacement of 213 cu. in. The six-cylinder models really constitute one group, for they have many of their parts in common, and there are only two assembly lines, one for the four-cylinder job and another for the sixes. Production is equally divided between the four and the six-cylinder models. All the castings and the raw materials come in from outside factories in other



Ramp connecting five floors. This roadway is used by sight-seeing buses as well as for the regular factory movement of cars and parts



Revolving tables are used in assembling transmissions, steering gears and axles

parts of Turin; forgings and stampings are made on the premises.

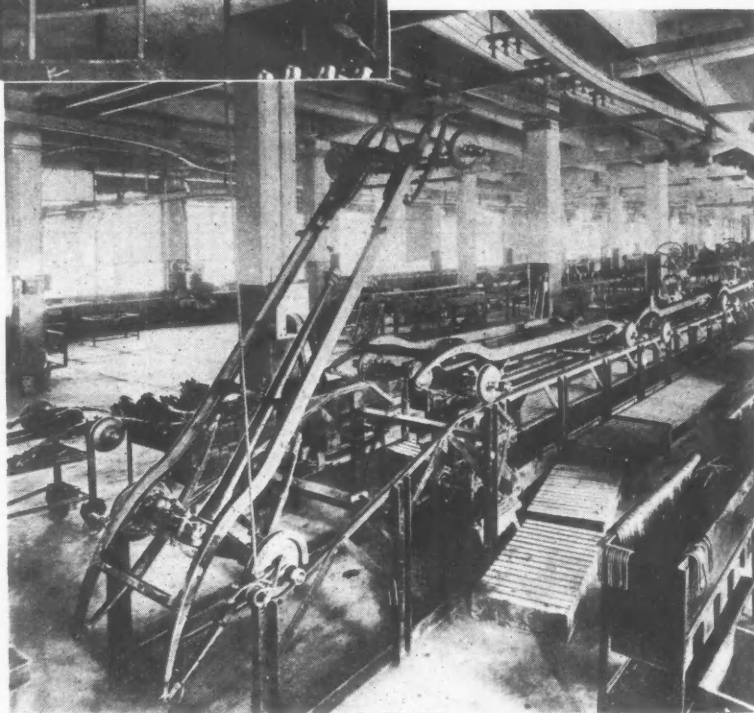
In addition to being the most important producing center, Lingotto is the central office controlling the outside factories, and is responsible for all designing of passenger cars, trucks, tractors and aviation motors. In addition to designing, Lingotto carries out all the first construction and experimental work on passenger cars, trucks and tractors. While the passenger cars are produced in the building in which they are designed, the trucks are built in the Spa and Ceirano factories, recently acquired, in another part of the town, and tractors are produced in an agricultural region at Modena. Airplane motor designs are turned over for production to the Corso Dante factory, which originally was the main Fiat plant.

The dominating idea in laying out the Lingotto factory was that raw material should enter on the ground floor, successively passing upward from floor to floor, until the finished chassis emerged on the roof-track for testing. The chassis then came down one floor for the body to be fitted, passing up again, in some cases, for a short final test on the roof-track, and was brought down by one of the spiral roadways either to the packing department, or for direct delivery, or driveaway.

It is a fixed idea of Italian automobile engineering that every chassis should undergo a road test, but as testing on the road is so costly and time-wasting as to make it almost prohibitive with big production, this building was designed for testing on the roof with the minimum waste of time and the most rigid supervision. In addition, a few chassis are picked out for a more thorough road test, as a check against the roof testing.

On the ground floor of the main building are the

tool rooms, the experimental department for passenger cars, trucks and tractors, with the special engine testing room by the side of it, and the production engineers' offices adjoining. This grouping permits convenient contact between experimental and production services and obviates time-wastes that might otherwise be entailed in meeting production requirements. The normal engine test room, while quite separate from the experimental engine test room, is divided from it only by a partition and makes use of the same water, gasoline and oil lines and the same underground



View of the main assembly line, with a chassis starting; about halfway, the engine comes into the line from overhead

exhaust conduit, discharging into a chimney having its outlet above the roof, 110 ft. from ground level. All engines are given an eight-hour bench test, the general plan, subject to modifications, being five hours at comparatively low speeds, two hours at 3000 revolutions and one hour from 3400 to 3600 revolutions. Each engine is run in one of ten silence rooms, before being dismounted, reassembled and sent up by the elevator to the chassis assembly line.

Most of the cylinder production is carried out on the ground floor, the castings being brought in on railroad cars from the foundry in another part of the city, and unloaded close to the machine on which the first operations are performed. Among the units in this department are vertical Ingersoll cylinder boring machines. While Potter & Johnston lathes

figure prominently, the tools are of various origin—German, American, Italian, and a certain percentage of Fiat's own construction.

On the second floor, cylinder machining operations are continued, these comprising all drilling and tapping, for which work Natco multiple spindle drilling machines are used. Cylinder blocks are washed in a Blakeslee metal washing machine. Rods are machined on this floor, crankshafts and camshafts are produced, and most of the small parts are machined. Engine assembly is carried out on this floor, there being two main lines, one handling the small four-cylinder engine and the other all the six-cylinder models.

Electric starting motors and electric generators are completely built on the third floor. On one portion of the floor, the machining operations on the motor and generator housings are carried out, and on a continuation of the floor the electric operations are conducted. There are two parallel assembly lines, one handling starting motors and the other electric generators. Each one of these terminates in an electrical test shop. On another portion of the same floor are machines for cutting both transmission and rear axle gears, and for machining transmission housings and the transmission assembly.

These assembly lines employ a circular revolving table, around which six men work, each one carrying out two or three operations. Steering gear assembly is carried out in the same way, but on the opposite side of transmission assembly. The transmissions are tested for efficiency and silence before being passed out of this department.

On the fourth floor, all machining operations on rear axle housings and torque tubes are executed, and axle housings are assembled. As in the case of transmissions, the assembling is done on a revolving circular table, having 11 revolving

stands, around which five men work, each one doing at least two operations. The parts required for assembly, such as nuts, bolts, washers, gaskets, cotter pins, etc., are carried in trays just above the assembly table. There are two assembly tables, one handling the axles for the small four-cylinder model, and the other the axles for all the six-cylinder models. The rear axle as-

In describing Fiat's Lingotto plant, located on the western edge of the City of Turin, Mr. Bradley states that it "is said to be the largest in the world under one roof, and of such a size that it will meet all requirements for many years to come."

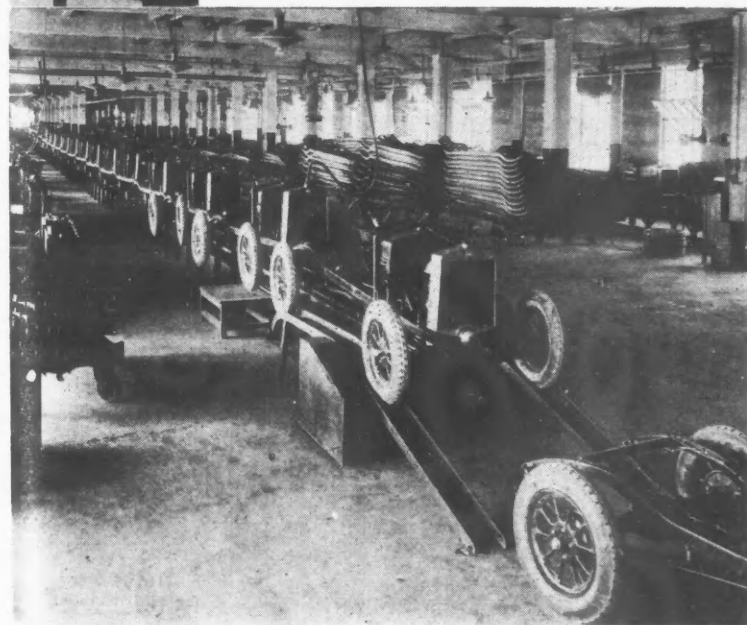
sembly is painted with nitro-cellulose, the units being carried on an overhead moving rail as they pass through the paint shops.

The fifth floor contains the chassis assembly line. There are two main parallel lines in the same building, one handling the small four-cylinder chassis and the other the six-cylinder models. The engines, coming up from the test shop on the ground floor, are brought into the main assembly line by means of an overhead side line, at a point where the frame members have been turned right side up, after springs and rear axle have been attached. Units such as instrument boards, radiators, etc., are prepared on lateral assembly lines and brought into the main line at the required point. The end of the main assembly line is immediately opposite the inclined moving rail emerging in one of the transverse buildings uniting the two straightaways of the roof-track. The chassis come up for testing with used tires and wheels and, in the case of the six-cylinder models, with an emergency gas dashboard carrying a gas tank. Entire radiator construction is carried out on the fifth floor, a continuous assembly line being used, so that the finished radiators come out where the chassis assembly line begins. Each radiator is subjected to a pressure test under water and to a vibration test of about three hours' duration.

A weighted test body is suspended above the point where the chassis emerges through the floor, and at the same point are overhead leads carrying water, gasoline and oil. About fifty seconds is the average time between the emerging of the chassis from the rail to the time it goes on the track, and during this interval the body is fitted, battery placed, radiator and gas tank filled and engine base chamber filled. In winter, the water and oil are heated.

As considerable snow falls in this part of Italy in winter, the hot water heating pipes are carried near the ceiling of the fifth floor, thus keeping the track at a sufficient temperature to cause snow to melt. Formerly when chassis were tested on the road, there were frequent delays because of weather conditions.

For the cheap four-cylinder model, the usual test run is about 16 miles. For the six-cylinder models, the distance run is 20 miles. There are silence rooms and workshops in which small



Model 509, a four-cylinder job of 60.4 cu. in. piston displacement, coming off the main assembly line and ready to go up to roof

adjustments are made under the cover of the banking at each end of the track.

Going back to the fifth floor, there is a second double-assembly line, on one of which the chassis are equipped with accessories, such as bumpers, fenders, running boards, and, on the others, body finishing is done. At the point where the body is dropped onto the chassis, the two lines unite.

Completely finished, the cars pass onto an elevated line, where the driving wheels are placed on drums and the brakes tested with a Cowdrey brake tester. Just beyond, on the same platform, are drums for transmission testing, and further on two eccentric drums which sway the entire car violently, testing springs, shackles and serving to reveal body squeaks. While the cars are on this elevated platform, workmen verify electric light switches, windscreen wipers, window lifts, speedometers, vacuum feeds, and all other accessories. In the case of special jobs, there is a short final test on the roof-track, but this is deemed unnecessary for ordinary production.

Body construction is carried out on the same floors, but in different parts of the building. Body panels, fenders and other metal parts are produced on the ground floor, mostly on Toledo presses. Wood frames, ready to receive sheet metal paneling, come in on the second floor, where there are two parallel assembly lines working in opposite directions, the two outside ones being for open and the two central ones for closed bodies. All body painting is carried out on the third floor. Body upholstery and trimming is produced on the fourth floor and finishing and mounting on chassis on the fifth floor.

Each story has windows from the ceiling to within 3 ft. of the floors. Usually, there are four parallel rows of machinery and a central alleyway from 14 to 20 ft. wide. Even on the lower floors and on the courtyard side there is abundant light. The central gangway is wide enough for trucks to pass down. There is a daily public sightseeing service operating 35-passenger motor coaches through the factory. The coaches drive down the central alleyways and pass upward from floor to floor by means of the spiral roadways at each extremity.

The offices are in a separate armored concrete building having a frontage on the Via Nizza. The main factory is parallel with and immediately behind the office structure. The basement contains dining rooms and kitchens for the staff, and also laboratories. On the first floor are offices for the general factory management and purchasing department. On the second floor are the general management and financial departments for all sections. Sales departments are on the third floor, Italian sales being on one side of the main staircase and foreign sales on the opposite side. The whole of the engineering staff is on the fourth floor. The fifth floor is occupied by

blue print and photographic sections, the telephone exchange and aviation drawing rooms.

In most departments, Fiat runs two shifts. The first begins work at 7 a.m. and finishes at 3.30 p.m., with a break of one-half hour at midday for luncheon, which is eaten in the shops. The second shift goes on at 3.30 p.m. and finishes at 11 p.m., also having a half hour for a meal. It is stipulated that there shall be eight hours of effective work. Thus, each shift has to be inside the factory half an hour before working time in order to change into working clothes. The

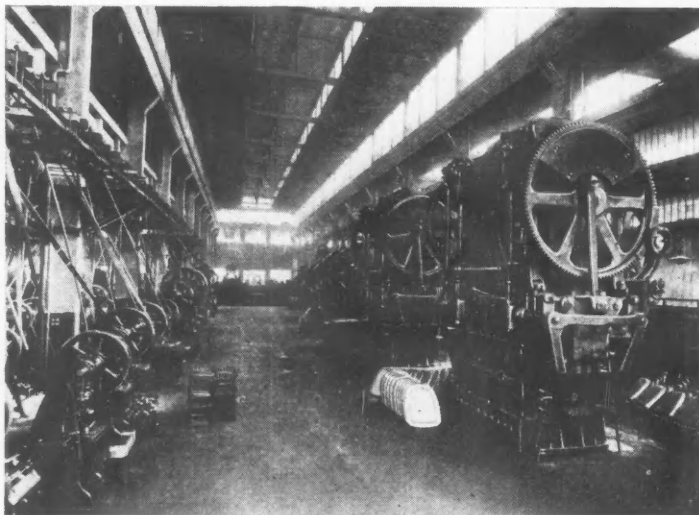
women in all departments are made to wear overalls, the same as men. Theoretically, smoking has been forbidden for years; now, it is effective from the lowest floor scraper to the managing director. The spirit of discipline and of enthusiasm which has been developed among the workers within a few years is almost miraculous, and it is helping to place Italy in the forefront of nations.

Airplane engines are produced at Corso Dante, in what was originally the main Fiat factory. This department receives its designs from Lingotto,

its cylinder forgings, crankshafts, connecting rods, castings, etc., from the forges and foundries at Lingotto or elsewhere, and carries out all stages of construction and final testing. Fifteen hundred persons are employed. Six distinct types of aviation engines are produced. Five of them are 12-cylinder V-type with forged cylinders having sheet steel jackets, overhead camshafts and all the auxiliaries grouped at the rear. One of these models has a geared down screw. A few months ago, a 90 hp., seven-cylinder, radial, air-cooled engine was manufactured for a two-seater touring plane produced by the aviation department of the company. The engine has steel cylinders with a screwed-in aluminum head and valves operated by pushrods and rockers. A first series of 350 engines is going through the shops.

The airplane section, established in 1915, and now producing wood, metal and combination wood and metal planes, is separate from the other factories and is on the edge of the Mirafiori flying ground, in the suburbs of Turin.

About 60 per cent of Fiat's automotive production is exported, and although the home market is expanding, this proportion apparently will have to be maintained. There are 14 direct factory selling branches in Italy and 18 foreign countries; namely: Paris, London, Madrid, Dublin, Berlin, Munich, Vienna, Prague, Warsaw, Geneva, Bucharest, Sofia, Athens, Constantinople, Alexandria, Buenos Aires, and San Paolo. The English Fiat Company operates an assembly plant, while in Germany the company recently has obtained control of the N.S.U. plants at Heilbronn and Neckarsulm. It is manufacturing in these plants and marketing through the Deutsche Fiat Automobil Verkaufts, of Berlin.



Battery of Toledo body presses

A. M. A. Conference Covers Wide Range of Administrative Subjects

Industrial effort strongly influenced by fashions and art, with personnel ideas inclined toward short-term employment pensions, executives hear.

AT the spring meeting of the American Management Association held in New York last week a number of subjects of broad general interest to automotive executives were discussed by well known industrial leaders. The complete program, filling the entire week, covered a wide range of administrative and management subjects, from the influence of fashion, style and art in industry to the training of office supervisors.

Of particular interest to automotive men were the remarks of H. E. Nock, Towle Manufacturing Co., who told how his company organized for style control. The designing room is made as pleasant as possible, since it is only under pleasant conditions that inspiration is likely to develop, and besides the designing room, another room is provided where models or samples may be studied in their usual environment.

A special committee studies each new design, Mr. Nock said, with a detached point of view, recognizing that not only must the new product be different, but that it must have positive values and emotional appeal.

A session devoted to the trend toward consolidations brought from Dr. Willard Thorp, National Bureau of Economic Research, a statement of his belief that the common opinion that operations on a larger scale, resulting from industrial consolidations, bring about economies in production, is untrue. Records indicate, Dr. Thorp said, that, often as not, the large concern operates at higher unit cost than the smaller one. Mergers have arisen in many cases out of marketing requirements, he believes, rather than from the necessity of lowering production costs.

The demand for nationally advertised goods has caused many smaller concerns to combine, in order that their products may thus be displayed. Legal restriction against price combinations has been another potent reason, according to Dr. Thorp, for many consolidations. He pointed out the interesting sidelight that although some large concerns cannot turn out goods at lower costs, they are, nevertheless, steadily absorbing a greater share of the market. This is being done at the expense of the middle-sized concerns, Dr. Thorp stated, while the small concerns are about holding their own.

Dwight Farnham, of Peat, Marwick, Mitchell & Co., in a

further discussion of industrial combinations, offered the following causes which have specifically stimulated mergers and industrial consolidations during recent years:

1. The overbuilt condition of industry following the war.
2. The development during the war of mass production, resulting in the introduction of scientific methods of management and administration, simplification, standardization, labor-saving machinery and progressive machining and assembly.
3. Increased cost of equipment required for mass production.
4. Improvement in technical practice.
5. New inventions resulting from research.
6. The high cost of distribution.
7. The application of mass methods to purchasing and retail distribution.

Mr. Farnham believes that the combination movement is growing rapidly throughout the world and that, started by the increased speed of transportation and communication during the last quarter of the 19th Century, it was accelerated by the war, which broke down the barriers of tradition, individualism and secrecy, substituting cooperation, coordination and combination, and stimulating education in management, economics and finance.

Mr. Farnham prophesied that the combination and rationalization of industry, coupled with ownership of industry through the wider distribution of securities, is leading rapidly to changes in our civilization of the utmost importance.

In discussing the treatment of men not eligible for pension who must be retired, George W. Vary, Bethlehem Steel Co., said that there

seemed to be a growing sense of responsibility on the part of industry toward employees whose separation from the payroll is forced by reasons other than their own personal inefficiency. Some companies have even adopted definite rules governing what is termed a dismissal age and, when the man is not eligible for a regular pension, either full or part pay for a stipulated length of time, is paid in instalments or in a lump sum.

Such recognition of continuous service is included in the Bethlehem Steel plan.

Trend in Mergers

ENFORCED development of mass production and distribution during the war period, resulting in the introduction of scientific methods of management and administration, as well as the simplification and standardization of machinery and parts, the introduction of labor-saving devices, progressive manufacture and assembly—all were major contributions to the great consolidation movement seen in the past ten years. The trend toward further mergers is still marked, in the opinion of economists who attended the spring meeting of the American Management Association in New York City.

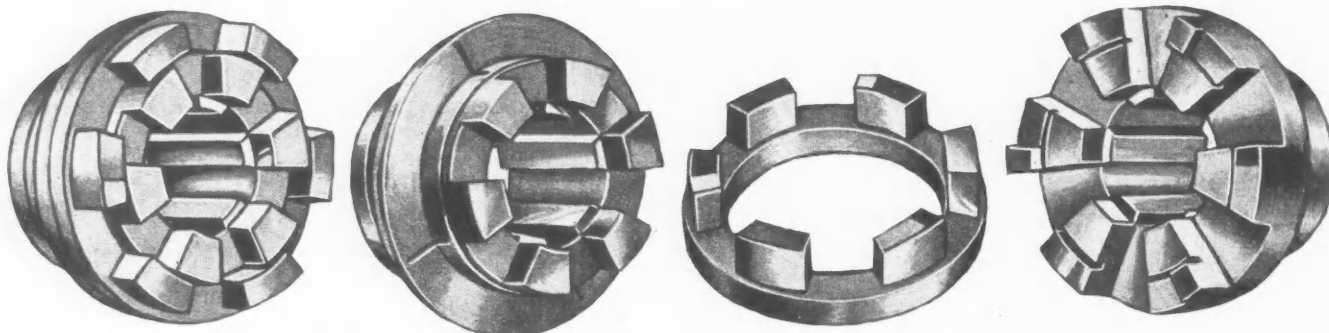
Salerni Transmission Coupling Facilitates Gear Shifting

Device "breaks" line, isolating gearset, making gear change silent and smooth. Braking effect of engine can be regained immediately from coasting position.

By M. W. BOURDON

A DEVICE termed the Salerni coupling has been introduced in England by the flotation of a public company to obtain from its inventor, P. M. Salerni, an Italian, the world rights, excepting on the American continents.

engine is accelerated once more. It will be realized, however, that unless the accelerator is released and the clutch pedal operated as just mentioned, the coupling does not render the engine unavailable for braking as in the case of a "free-wheel." If the coasting effect is



The view on the left shows one member of the coupling with the floating ring in place; the next view shows the same member with the floating ring removed; the third view shows the floating ring and, the view on the right, the other member of the coupling

The Salerni coupling is intended to be located between the gearset and the front joint of the propeller shaft. It consists of an ordinary dog clutch, between the two members of which is interposed a floating ring, the function of the latter being to prevent the dog members from re-engaging one another unless they rotate at precisely identical speeds. When the engine clutch is disengaged fully, the dog clutch units are withdrawn from one another, and the ring is immediately turned to a position where it acts as a distance-piece between the dog members, the latter then being prevented from inter-engaging. The transmission line is thus "broken," the car is brought to a coasting condition, the gearset is isolated and, consequently, the gears can be changed easily and silently.

When the engine clutch is re-engaged and the engine is accelerated to take up the drive, the effect is to speed up the transmission driveshaft. As soon as the latter, which carries one unit of the dog clutch, reaches the exact rotational speed of the shaft carrying the other unit (the propeller shaft) the "synchronizer ring" is rocked in the reverse direction to its previous movement relative to the units of the dog clutch and brought into its original position, so allowing the dog members to re-engage automatically.

To secure the coasting or free-wheel effect, the accelerator pedal is released, the clutch pedal depressed fully and then released. The dogs will thereby have become disengaged and be held thus until such time as the

being utilized at any time, however, the braking effect of the engine can be regained immediately by depressing the accelerator pedal for a moment.

The principal point of interest at this stage is how the synchronizer ring is caused to act as described. This is effected as follows: As shown in the accompanying illustrations, the dog clutch units consist of two members, one of which, the driving unit, is free to be moved axially upon its castellated shaft by means of a yoke engaging in a groove; its rear face is composed of dogs forming approximately half the width of a boss extending from a flange; surrounding the boss and with abutment against the flange is the synchronizer ring, which also has a series of dog teeth, partially and slightly chamfered in one direction.

The other half of the dog clutch, the driven member, has dog teeth corresponding with those of the driving member and a second or outer series in alignment with the dogs on the synchronizer ring. Three of the outer dogs on the driven member have projections or minor dogs representing about one-third of their face width; the others are chamfered like the dogs on the ring.

When the coupling is engaged normally, the driving and driven dogs are interlocked, and so also are the dog teeth of the ring and the outer ones of the driven member. If a change of gear is to be made, the clutch pedal is depressed fully (partial depression will not suffice); the link between the pedal and the coupling then causes the driving dog member to be drawn for-

ward away from the driven member, and the two main units are free to rotate at different speeds. When the driving and driven dogs are separated the frictional contact between the ring and its flange abutment and boss tends to cause the ring to move with and at the same speed as the driving member; but it cannot move far relative to the projections or minor dogs on the driven unit; the latter carry the ring around with them, and it then rotates freely on the driving member.

The change of gear can then be made easily, irrespective of engine speed or road speed; alternatively, the clutch pedal can be released and the car will coast with the original gear engaged.

When a change of gear has been the object, the clutch pedal will have been released immediately the lever has been moved to the required position, as usual, and the accelerator pedal depressed. The latter operation will speed up the gears, the driveshaft and the driving dog unit. As soon as the speed of the driving dog reaches that of the driven dog, the synchronizer ring will be carried around with the driving member until its teeth are dead right for reengagement with the outer main dogs on the driven member; they cannot go beyond that position because of the minor dogs, and they are eased into engagement by the chamferings.

At this stage, however, a weak point of the scheme must be mentioned. Until the reengagement of the dogs is complete, the engine clutch cannot be fully engaged; the clutch pedal will only move about half way to its normal position owing to its being coupled to the driving dog. So, unless the link between clutch pedal and

driving dog be precisely adjusted, so that there is sufficient contact between the clutch plates to rotate the gear shaft when the accelerator pedal is depressed, no speeding up of the driving dog will occur and the ring will remain in the position in which it prevents reengagement of the coupling.

If, while traveling forward, the driver were, in error, to move the gearshift lever into reverse, the transmission would receive no shock; the coupling would not engage, as the parts would rotate in opposite directions and would continue to do so until the car came to a standstill.

Thermomagnetic Analysis

WHEN magnetic materials are heated to a certain temperature they lose their magnetic properties. This temperature is the so-called transformation point, which is of great importance in the heat treatment of steel. The study of the magnetic effects occurring in materials during heating or cooling, with special reference to their interpretation in terms of structural changes or transformations, is known as thermomagnetic analysis. Such analysis is most conveniently carried out by means of a magnetometer of suitable type. An apparatus for thermomagnetic analysis has been developed recently at the Bureau of Standards and is described in Research Paper No. 50, by Raymond L. Sanford.

Furnaces for Heat-Treating Small Parts

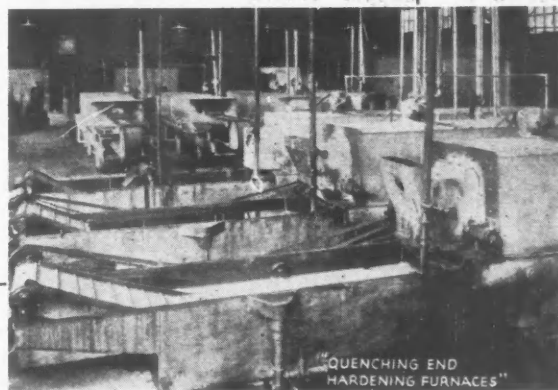
CONTINUOUS-BELT feed, heat-treating furnaces are becoming increasingly popular in automotive plants for heat-treating small parts, due to the flexibility of the furnaces. Adjustable thermostatic controls usually are provided, and this, in combination with a simply effected variation in the belt speed, provides practically any heat-treating condition as to temperature and duration which might be desired. Fig. 1 shows the loading

end of such a furnace, here used for heat-treating piston pins at the plant of the Oakland Motor Car Co. It will be noted that this installation is of the semi-automatic loading nature. Fig. 2 shows the quenching end of one of these furnaces at the plant of the Victor Peninsular Co., manufacturer of this particular type of furnace. The view shows the secondary belt used to carry the small parts out of the quenching bath. The furnace is oil fired, and usually is provided with three heat control stages.



Fig. 1 (left)—The loading end of a continuous-belt feed, heat-treating furnace at the plant of the Oakland Motor Car Co.

Fig. 2 (right)—The quenching end of a heat-treating furnace at the plant of the Victor Peninsular Co.

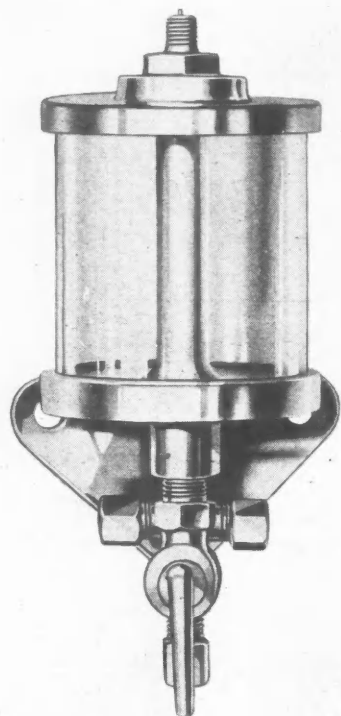


NEW DEVELOPMENTS—Automotive

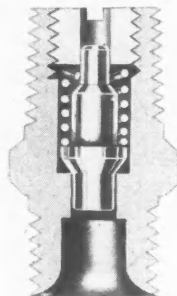
Logangear Sullins Lubricating

LOGANGEAR PRODUCTS CO. of Toledo, Ohio, has recently developed the Sullins centralized lubricating system for chassis lubrication. The system operates by air pressure supplied by any tire-filling device. Where compressed air is available, as at filling stations, the operator merely applies the air line chuck to the lubricator and the chassis is oiled instantly.

The system mounts a glass and metal reservoir on the front side of the dash under the hood. Copper tubing fitted with a plain oil valve connects with the motor



Main reservoir of Sullins lubricating system



Above — Sectional view of resistance unit

lubricating system, so that the reservoir may be filled with oil merely by opening the valve while the motor is running. This method eliminates the necessity of filling the instrument by hand or carrying in stock special lubricant. Copper tubing transfers the oil to the points of application.

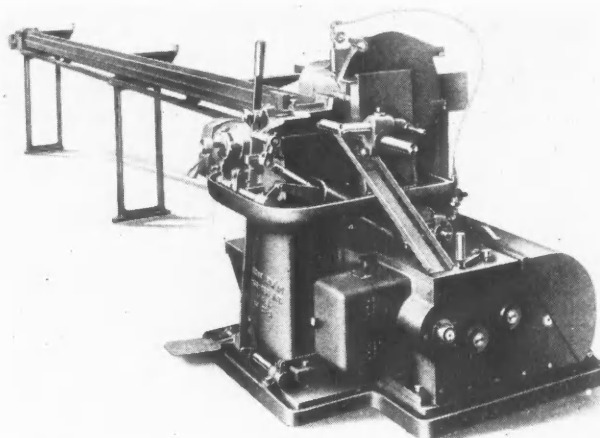
At the point of application a resistance or controlling unit is employed which consists of a brass fitting screwing into the part to be lubricated. When chassis lubrication is desired the operator places the air chuck on the valve in the top of the reservoir and applies pressure. The air forces the oil through the tubing and into the resistance unit where a predetermined amount of oil is trapped. When pressure is discontinued the oil trapped in the resistance units is released to lubricate the part.

The operation of the resistance unit is such that it delivers a measured amount of oil and prevents excessive lubrication irrespective of the clearances in the part to be oiled. There are no mechanical movements

employed in the Sullins system. The system is simple in design, construction and operation and is said to be so inexpensive that it can be included in cars of the lowest price class.

Cochrane-Bly Cut-Off Saw

A NEW automatic high speed cut-off saw for cutting to length brass, copper, aluminum bar and tubing, hard rubber, bakelite and wood strip, has been devel-



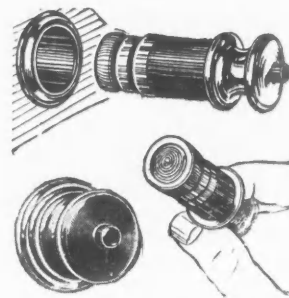
Cochrane-Bly automatic high-speed cut-off saw

oped by Cochrane-Bly Co., Rochester, N. Y. The machine has automatic power stock feed and automatic clamping vise and trip. It has a capacity to cut 2-in. copper bar, 3-in. brass bars and 4-in. brass or copper tubing.

Carriage movement is adjustable from $\frac{1}{2}$ to $4\frac{1}{4}$ in. and speed varies from 5 to 50 strokes per minute with standard speed gearing. The spindle is heat-treated and mounted in dust-proof Timken roller bearings. Silent chain drive to the motor is used.

Cordless Dash Lighter

A NEW cigar lighter, operating from the dashboard of a car, has been introduced recently by the Cuno Engineering Corp. of Meriden, Conn. It is called the Cuno Concealed Electric Match. Model 1630, as illustrated, is cordless, and is installed through the dash by drilling a 15/16 in. hole. Connecting wire and tube are concealed; the only parts protruding are the unit handle and contact button. It has a lava base.



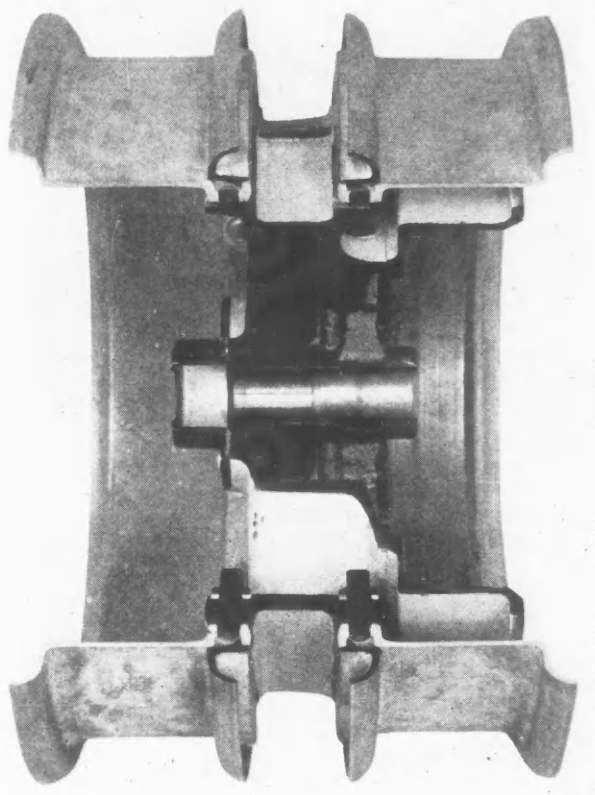
Cuno electric match

Parts, Accessories and Production Tools

Cast Steel Bus Wheel

A CAST steel dual wheel for bus and truck use is being introduced by the Michigan Steel Castings Co. of Detroit. Its features are:

1. Each rim held independently.
2. Fixed spacing between rims.
3. Reversible rims, enabling use as single-tire wheel.
4. Good ventilation and cooling for brake drums.
5. Positive location of the wheel when mounting.



Cutaway view of the new dual steel wheel offered by Michigan Steel Castings. This view shows the method of mounting and locating the rims by means of pins and studs. Note also large air passages outside brake drum

As may be seen from the accompanying views, the wheel consists of a central portion composed of the four U-section cast steel spokes and a pilot flange for mounting the brake drums. At the outer end of the spokes there are drilled flanges for mounting the rims. The latter are positively located by means of pins projecting outward from these flanges and are held on by radial bolts, two to each spoke per rim. The radial disposition of these bolts also insures a positive drive for the wheel.

The removable rim ring is positively located by a boss on the hot rolled section of the rim proper. Since the rims overhang the wheel, rim bolts and tire valves are easily accessible. A simple reversing of the outer or inner rim with the removable ring on the outside, leaving off the other rim, quickly converts the wheel into a single rim type. This is said to be an important



Photo of 18 by 6-in. dual cast steel wheels showing simple design

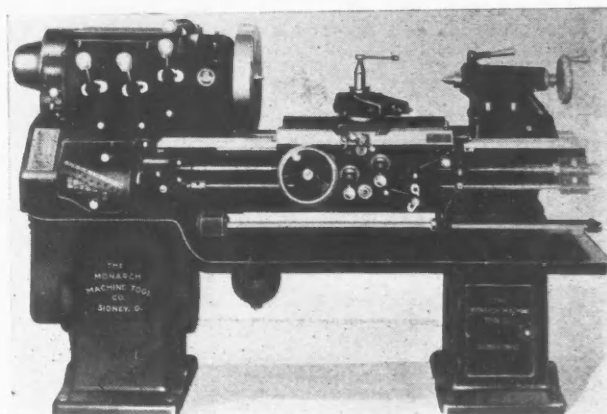
feature when operated over roads that differ greatly in character.

Good cooling for the brake drums is insured by the considerable air space between these and the inner rim. It is also claimed that air is sucked through the space between the outward drum and rim flanges by the rotating wheel, the air coming from the large space outside the drum mounting flange between the wheel spokes.

The entire wheel is said to be exceptionally light. Spokes are cast steel, as are the brake drums. Rims are hot rolled and milled, including the locking ring.

Monarch High Speed Lathe

THE Monarch Machine Tool Co., Sidney, Ohio, has developed a new line of Timken bearing lathes in sizes from 14-in. swing to 36-in. swing and providing



Monarch high speed lathe.

maximum spindle speed of from 600 to 1500 r.p.m. These new helical-gear lathes have been designed par-

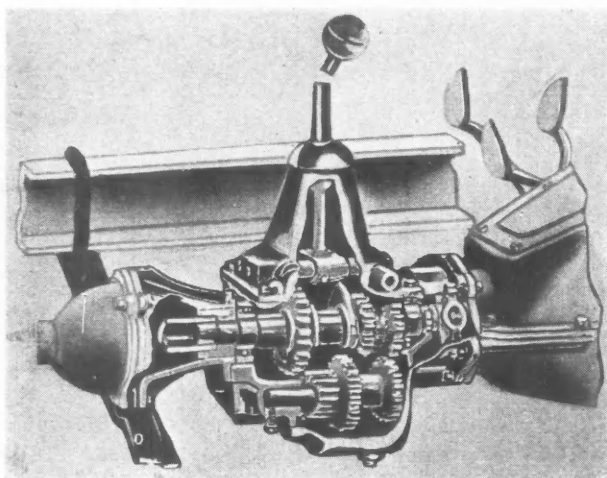
New Developments of Interest

ticularly for use with the new tungsten-carbide cutting tools with which cast iron can be turned up to 500 or 700 surface cutting feet per minute, and other materials at corresponding speeds.

While designed particularly for high speed work, the new lathe may be used at slower speeds when cutting tools of ordinary high speed steel are used. At high speed the lathes operate quietly, smoothly and with precision. Due to special features of construction the lathes show no vibration or gear tooth marks even at top speed.

Muncie Transmission

BELOW is the cross-section interior view of the new four-speed transmission just brought out by the Muncie Gear Works of Muncie, Ind.



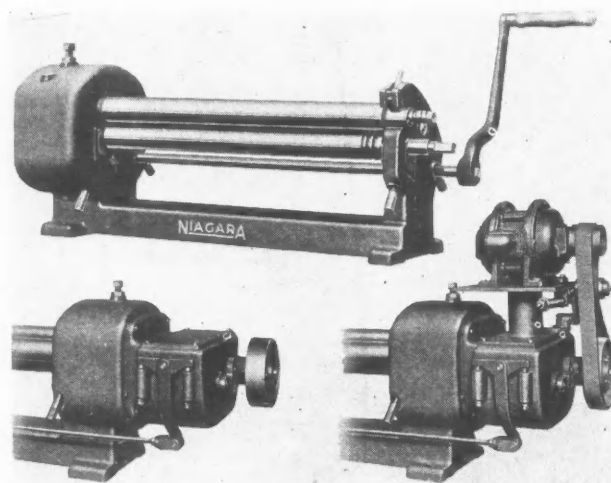
Muncie four-speed transmission

Niagara Slip Roll Former

THE Niagara Machine & Tool Works, Buffalo, N. Y., have added a 3-in. diameter size to their line of slip roll formers. This former is intended for the forming of sheet metal in cylindrical shape. It is of geared construction and is arranged with the top roll pivoted at the left-hand end to swing forward for removal of finished work. It is locked in the operating position by a quick releasing trigger mechanism.

Three sizes are available, 36, 42 and 48 in. long, and all can be furnished for hand operation, pulley drive, or belted motor drive. The rolls are of special high-grade tough steel turned and polished. The base extends across the entire length of the machine to give maximum rigidity. It is of channel type construction to insure permanent alignment of rolls, bearings and housings.

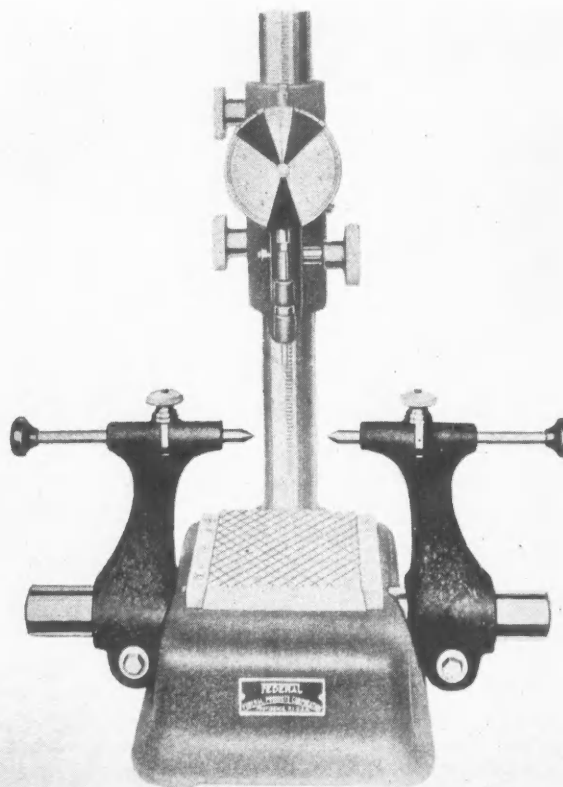
The machine is single geared and maximum capacities can be rolled without reduction of speed. All three rolls are positively driven, making possible the rolling of small diameters.



Niagara 3-in. slip roll former

Federal Dial Comparator

THE Federal Products Corp., of Providence, R. I., has developed a new direct reading comparator with the dial equipped with limit reading shields and graduated to .0001 in. Roller type V blocks and centers are also available with the equipment. The maximum range of the dial with V block is 8 in. and the maximum swing between the centers is 3 3/4 in.



Federal dial comparator

Just Among Ourselves

Astute Chief Can Make Export Technicality Pay

CLOSE analysis of transportation, tariff and customs requirements for each foreign country makes it possible for the astute automobile export man to devise numerous ways in each specific case to secure a reduction in the cost of a car shipped to that country.

Trouble is, as an expert in one of our biggest domestic producing companies complains in a letter to us recently, that "by attempting to follow the special ways for each country, the export division is burdened with a set of specifications for packing, so complicated and cumbersome as to increase materially the cost on this side and thus tend to nullify the saving desired at the receiving end.

"Added to the foreign requirements," the letter continues, "in this country we have regulations of our own due to railroad rate classifications. Material is segregated by type in various boxes and thereby it is possible to effect a considerable saving between factory and seaports. This, therefore, must be considered an attempt to standardize on procedure."

* * *

Standardization Desirable But Unlikely

TO get anything like standardization of procedure in foreign shipping requirements, however, probably would require vigorous activity on the part of some agency as powerful as the League of Nations, as J. D. Mooney said in the paper which he prepared for the 1929 S.A.E. annual meeting.

The complications as they stand today can scarcely be realized by the average automotive executive unless he has delved definitely into this particular subject. Let my correspondent—a factory man involved with these matters as practical every-day problems—

recount just a few which come to him as examples of the multiplicity of detail involved.

* * *

"Pay Your Money and Take Your Choice"

FOR assembly, Poland wants cars with the bodies in K.D. condition, trimmings shipped in a separate box and the chassis assembled. In this case a great waste in shipping space results because the volume under the body cowl sub-assembly has heretofore been used for the trim parts. To build the chassis at the factory, it is necessary to install a temporary cowl with the instrument board, vacuum tank, etc., in order to run the car for test purposes and to deliver it to the export crating division where all of these parts again must be disassembled and returned to the main plant assembly line for reuse. This expense would not be necessary if the chassis could be shipped in K.D. condition.

Shipments to Mexico when weighing over 1250 kilos are classified under a higher tariff bracket.

In the case of Belgium the same applies excepting it starts at 1800 kilos. The result is that if a car weighing above this can be stripped of non-essential parts such as bumpers, tool kits, spare rim, shock absorbers, such must be done in order to bring the weight below the rate-change point mentioned before.

In the case of Australia and Canada, the tariff is based on value, which in the case of Canada changes at \$1,200 and consequently if this can be arrived at by removing the non-essential parts, such must be done, and shipped separately as service parts or accessories.

Germany grants a decided reduction in tariff by sending the chassis frame parts coated with non-rust oil instead of primer. The oil coat is an extra expense here and must be removed on

the other side and then the parts primed. All of which is decidedly more costly than applying the primer at the time the frame part is made as is customary with domestic parts.

Furthermore, the detail of maintaining stock records, issuing special orders to departments and making a special inspection of these parts adds to the manufacturing cost.

* * *

We Always Had a 7-Ton Truck in Mind

THERE are some things that one has always wished to say, but which one has refrained from saying for fear one would be thought as unreasonable as one really is. The next best thing, in such cases, is to find someone else who has said the thing and quote him prominently. William Feather, the wayside philosopher of Cleveland, had a piece in his *Philadelphia Public Ledger* column the other day that expressed one of our pet-hate ideas better than we ever could hope to have done. Here it is:

"Every man at some time wishes to do something of service to his community.

"I have often thought that I should like to do my bit in this way: I have in mind designing a special type of automobile frame, which will be as tough and strong as a tractor body. The motor will be high-powered, capable of developing great speed. Special protection will be given to the driver of this car, to save him from injury in a smash-up.

"Seated in this man-o'-war it is my idea to move rapidly over the highways of the city and country districts. When another driver flagrantly violates the traffic laws, and boldly places himself in danger, expecting me to meekly move out of his way, it is my idea to hit him head-on."

Thanks, Mr. Feather.—N.G.S.

Present Practice in Aircraft Welding Almost Confines Use to Fuselage

Greater knowledge of welding and better facilities for heat treatment increase tendency toward metal wings although majority are still of wood structure.

AT the annual meeting of the American Welding Society, held in New York City recently, the subject of "Welding in Aircraft Construction" was dealt with in a paper by Richard M. Mock, aeronautical engineer of the Bellanca Aircraft Corp., New Castle, Del. Mr. Mock said the first metallic airplane structures were fuselages of welded carbon steel (Fokker, 1911), used together with wood wings, a type of construction quite popular today. A parallel development had been that of the duralumin plane, but since duralumin cannot be welded successfully, the parts are riveted together. In these airplanes only the most highly stressed parts are made of steel.

The use of duralumin tubes with steel fittings is almost standard practice in England, and also has a certain vogue in this country. Here the steel fittings are of welded construction, but since many European countries do not permit welding in the primary structure there, the fittings must be machined. This form of construction is employed in the Curtiss Falcon, the standard observation plane of the Army Air Corps, welded steel fittings being used for securing the duralumin tubes.

Wood is gradually being replaced by metal in airplane construction; wherever high stresses occur, steel seems to be the best material, and the use of steel naturally leads to welded construction.

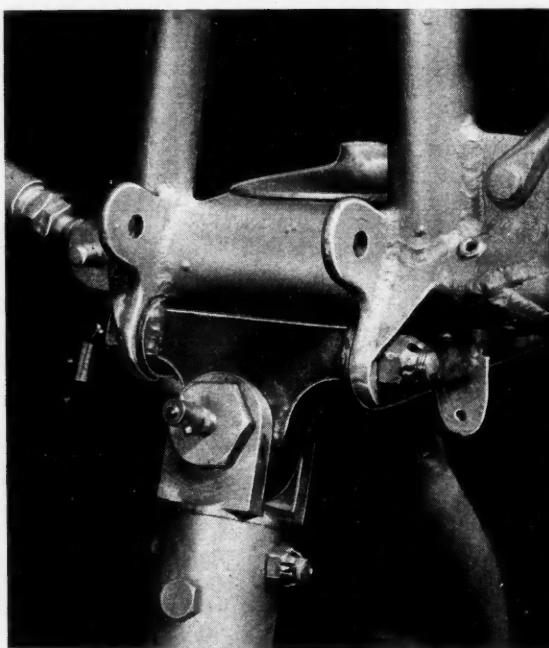
Though welded fuselage structures have been standard practice for the past few years, welding was retarded by a lack of knowledge of the subject on the part of aircraft designers. Of late, numerous tests have been run by various agencies, such as the Bureau of Standards, Army Air Corps and various individual manufacturers, on the strength of welded structures. This increased knowledge of welding has resulted in an increased use of welded parts. Welded steel control surfaces are now standard on almost all American airplanes, and though the majority of wings are still constructed of wood, there is an increasing ten-

dency toward metal, both duralumin and welded steel. Fittings of duralumin and steel are used about equally. Heat treatment facilities have aided greatly in the use of both duralumin and steel construction, and now heat-treated welded parts are common practice.

In this country it is now practically the standard practice to use welded steel tubing in the fuselage structure. Round steel tubes are used, as a rule, arranged in the form of a truss, the tubes meeting concentrically. Four longitudinal members give the fuselage its rectangular cross section, and these are braced by additional cross tubes or wires. Simple joints are employed at the rear of the fuselage, but since the interior of the forward portion must be unobstructed, a rigid box without cross bracing is required there.

Tests on typical joints have shown that the maximum strength may be obtained by taking great care that each of the parts welded is heated to the proper degree. One thing that must be guarded against is too great a difference in the thicknesses of the materials. In aircraft construction exceptionally light gages are used; most of the sections are 0.035 or 0.049 in. thick, while a few measure only 0.022 in. If care is not taken, one piece of metal may be burned before the other has reached the proper temperature for fusion.

Edge welds should be avoided, and the design should be such that welds may be made away from the heavy member and toward the light one. When very light gage material is employed welds should be made from one side only. In addition, care must be taken that the members will cool without causing undue internal stresses. This often causes cracking in a light gage member when it is one of a number that form a cluster of tubes, or is welded to a much heavier member. As the tubes cool after welding, there is a certain amount of annealing adjacent to the weld. If the design of the joint is such that there is a complete circle of weld around the tube, and there is a bending stress in the member, it



Landing-gear and wing-hinge fittings of Curtiss pursuit plane. Note the hollow rivet used for additional strength

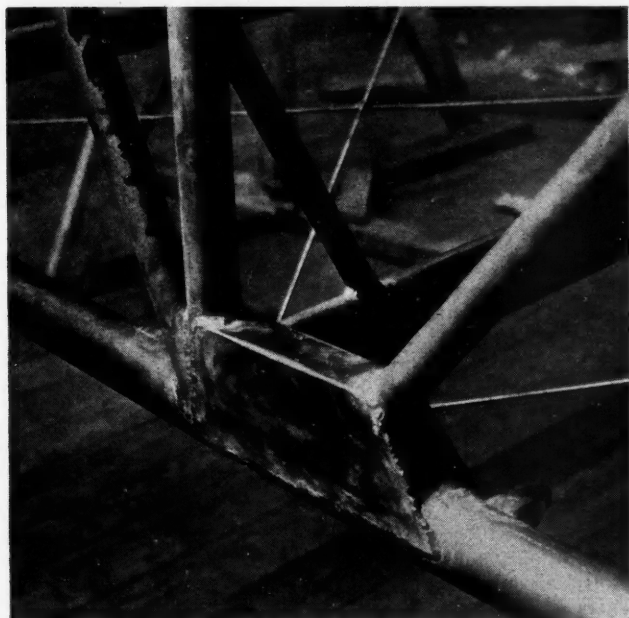
will undoubtedly fail in this annealed portion. A complete circle of weld usually may be eliminated by producing a "scraff" or "fish mouth" effect, which gives a slightly longer weld. Though this slightly increases the cost of production, the resulting increase in strength more than compensates for this. Of course, in all simple tubular columns there is a circle of weld at the ends and for this reason a coefficient of fixity of 2 is used when using any of the column formulae. When members are continuous through a joint, they are calculated as two separate members meeting at the joint.

In the design of welded joints it is nearly always possible to eliminate welds in tension and place them in shear. Failures have been known when tension welds have pulled out completely by tearing in the annealed portion.

It is customary to have all the members meet concentrically, unless the eccentricity is taken into account in the design of the affected members.

It is often found necessary to employ other than round members in airplanes. To give strength in the proper direction I-beam sections, box sections and oval sections are employed. To facilitate manufacture, square section tubing is also used. Practically all of these sections are employed in the construction of a Bellanca fuselage. In addition, much of the secondary structure, such as cowl and fairing supports, control braces, pulley housings, etc., are welded to the primary structure.

Occasionally, by force of circumstances, one has to break some of the basic rules of welded joint design. In the Bellanca planes, for instance, it is necessary to weld a 1/2-in. steel lug to an 0.049-in. sheet. To do this



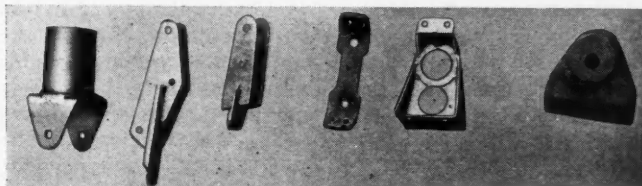
Fuselage joint of Bellanca C.H. monoplane, showing bracing and reinforcement

properly, it is necessary to have two welders with two torches. The helper aids in preheating the heavy piece while the welder joins the two members. It may be well to mention here another "trick" that is often resorted to. Should a weld be made on one side of a tube, the tube will bend so that it is concave on the welded side. A little heat applied to the opposite side will straighten it.

Cost is an important point in the design of welded joints, the chief item being labor. The latter is made

up of the labor of preparing the members and that of welding them. The ends of members should be simple, so they may be prepared cheaply. Odd curves, slots and "fish mouths" all tend to increase costs. Besides, the welds should not be unnecessarily long. It is sometimes better to change the section of the member than to use a very long weld. The truss, moreover, should be of such design that it will fit the jig without too much complication.

At the present time there is a tendency away from welded aircraft fittings toward forgings and high-



Some fittings of the Bellanca C.H. monoplane

strength aluminum alloy castings. Usually, in the first planes built, the fittings are welded up, and later these welded fittings are replaced by forgings or castings. However, a considerable number of highly-stressed parts are being welded and heat-treated or normalized later. This is quite common on tension members. Often a small unit of an assembly, such as the landing gear, is first heat-treated, and welded to the assembly afterward. In such cases the weld is made at a sufficient distance from the highly-stressed heat-treated unit that the heat of welding will not affect the heat treatment. It has been proposed to heat-treat such assemblies in jigs to prevent distortion, but Mr. Mock said he did not know of any case where this had been actually done. He believed, moreover, that if the heat treating were carefully done it would set up no undue stresses in the assembly.

Mr. Mock dealt at length also with the subject of materials. Chrome-molybdenum steel, corresponding to S.A.E. No. 4130 specification, is the most common. This steel has air-hardening properties which makes it highly desirable for welded parts. Light-gage parts may often be worked in the annealed state and then welded with the rapid air cooling resulting in a certain amount of heat treatment. Occasionally it is desirable to have more bulky material, without increase in strength, especially in parts subjected to repeated stresses, such as engine mountings, in which case 1020 steel is employed. However, chrome-molybdenum steel would, with the same weight, give still higher strength, and if carbon steel tubing were eliminated, there would be no possibility of a workman mistaking it for chrome-molybdenum steel, which might lead to disaster. It is for this very reason that many plants stock only chrome molybdenum tubing. However, for fittings usually bent up from sheet stock, where intricate bends are necessary and the material therefore has to be reheated repeatedly, carbon steel is desirable. Sometimes it is desired to use large-diameter tubes which cannot be obtained in chrome-molybdenum steel, and it is then necessary to resort to carbon steel tubing.

Nickel steel is used almost exclusively in bolts and other highly stressed members. Mr. Mock said that, although welding of nickel steel is prohibited in aircraft work, he had found that a highly skilled welder could weld it quite successfully. However, he admitted that the human element was too great a factor and that welding of nickel steel was poor practice.

Another material used in limited quantities in air-

craft construction is Stellite. Tail skid shoes are subject to considerable abrasion, and though made of manganese steel (which is highly wear-resistant) are usually finished with a $\frac{1}{8}$ -in. layer of Stellite welded to the bottom.

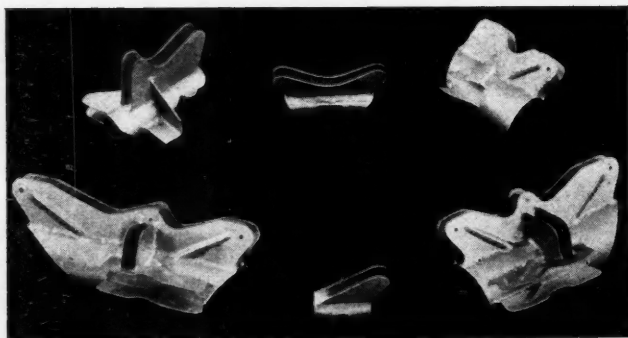
Welded structures are especially desirable for experimental purposes. Elaborate jigs are unnecessary; the equipment required is comparatively cheap, and changes may be made with a minimum of effort. A part may be tack-welded on in the first place, and if its use is finally decided upon, the weld is completed; otherwise it may be knocked off without injury.

Airplane control surfaces of welded steel tube construction are now becoming quite common. They usually consist of one large diameter main member, with small diameter, light gage tube welded to it.

Welded wings are being constructed with spars built up of two tubes spaced about 8 in. apart, with a Warren truss of tubing welded between them. Considerable labor is sometimes expended in welding. This is accomplished by continual heating and hammering until the desired lines are obtained. Heat-treating furnaces are now available for heat treating spars up to 25 ft. long. Welded wing ribs are not believed desirable, because of their weight and the difficulty in getting a perfect contour for the wing section.

In addition to welding in steel, a great deal of aluminum welding is done, especially on gasoline and oil tanks. Tanks of both aluminum and duralumin are riveted, and then the seams and rivet holes are welded over. Fittings for the tank connections also are welded in place, and there is a small amount of aluminum welding on cowlings and fairings.

Swedish-iron welding rod has proved most satisfactory for welding chrome-molybdenum members. However, if the assembly is to be heat-treated after welding, it is usual to use welding rod of the same material as the parts to be welded, in order to obtain a more homogeneous unit after heat treatment. Actual tests have



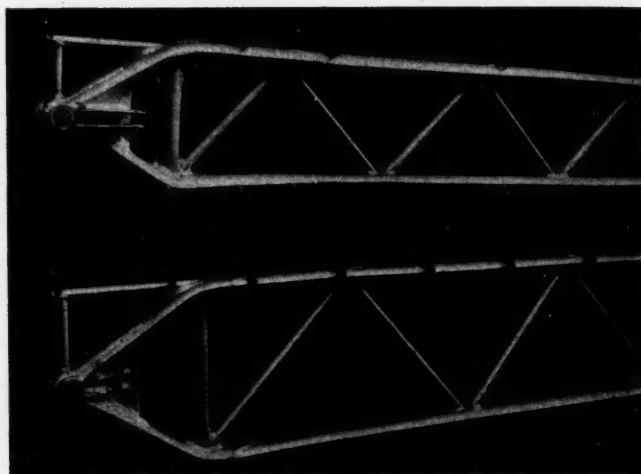
Curtiss fittings for ends of duralumin tubes

shown that an excellent joint can be obtained, though the welding is somewhat more difficult. This applies only to parts for heat treatment. Some authorities state that they have tested joints using chrome molybdenum rod and have had consistently high values and then found one member with strength about one-quarter of the rest. This might be attributed to the difficulty of welding.

As to the welding equipment used, Mr. Mock said, oxy-acetylene was used almost exclusively because of the greater knowledge and experience in the use of gas welding. He knew of only one manufacturer employing electric arc welding. The cost of elaborate and complicated jigs has been almost prohibitive, because designs are changing so rapidly and are produced in such

limited quantities. Torches for aircraft welding are usually quite light and employ fairly fine tips. At the Bellanca plant the men prefer a lightweight torch with a good grip about $1\frac{1}{2}$ -in. in diameter.

In endeavoring to avoid the various difficulties connected with welding, manufacturers are employing riveted duralumin structure. Duralumin loses most of its strength in welding and it cannot be restored by any



Wing spans of chrome-molybdenum steel tubing on Curtiss Condor twin-engined bomber

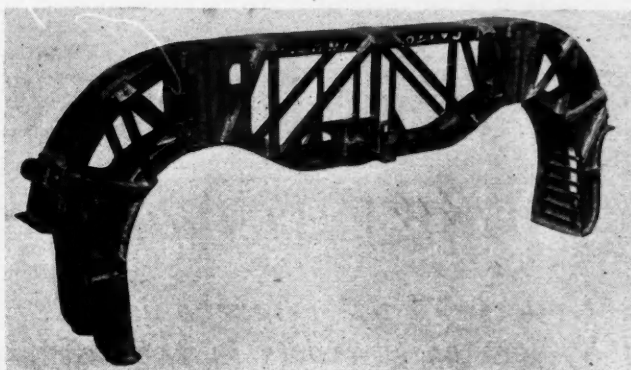
form of heat treatment. In riveted structures of light gage duralumin the heading of the rivets causes the metal to elongate, necessitating jigs almost as elaborate as those to prevent warpage in welded structures. There is an increased labor cost, as practically every riveter must be assisted by a header. In addition, there is again the problem of workmanship. If the holes for locating the rivets are not drilled properly a few of the rivets will carry the entire load, necessitating the use of an excessive number of rivets to prevent failure. Should the rivet holes be elongated, additional complications result.

In welding fuselages, the manufacturer is confronted with the problem of warpage and truing up. It might be well to describe the methods employed in the Bellanca shops. The tubes are first cut to exact size and prepared for assembly in the fuselage jig. That is, the ends are cut and all bench welding possible is completed. The members are then placed in a heavy jig of angle irons. This jig is built to have the same shape as the fuselage, so that with the tubes clamped in the corners of the angles they form the side truss panels of the fuselage. Both side panels may be welded at once. In this jig all of the outside welding is completed. The jig is mounted on bearings, so that it may be easily turned over for welding the bottom. No tack welds are employed, all welds being completed. Tack welds are avoided, as warpage would have the tendency to pull the tacks, or if they were too strong, cause some harm. About 75 per cent of the welding is completed in this jig. The side trusses are then taken out and stored temporarily. In taking the trusses out of this jig there is practically no tendency for the members to cling to the angles, and no tendency to spring after being removed. The panel checks to within $\frac{1}{8}$ -in.

By using this jig, six side panels or three pairs are produced in one eight-hour day, employing four welders and two set-up men. Heretofore, fuselage welding has been the "neck of the bottle" in aircraft production. By using more men and working shifts, the rate of production can be increased considerably. At Bellanca,

Harold Schneider, the welding foreman, designed both the jig described and an assembly jig as well as having charge of the training and supervision of welders.

The fuselage assembly jig is of much lighter construction than the jig previously described. It, too, is made of angles, but of light gage. Unlike the primary jig, it supports the members from the outside. In it two side frames are placed, the cross-members are then located and welded in place, wing hinges first and engine mount next. The welders work back to the tail where the tail post is welded in place as the last operation. In this jig all except about 5 per cent of the welds



Welded landing-gear box on Bellanca C.H. monoplane. It is made of chrome-molybdenum sheet and square-section tubing

are completed. Upon removal, the fuselage is true for length within $\frac{1}{8}$ in., while the hinges are never more than $\frac{1}{32}$ in. out, if at all. It must be realized that this is exceptionally accurate, considering the complication of the truss and possibilities of warpage and deflection.

After leaving this last jig, the landing gear assembly is welded in place. This consists of a box built up of sheet steel and square section tubular cross-members. Then tie-rods are put in place and trued up. The welds are now minutely inspected and fuselage passed on to be protected against corrosion.

Kent-Owens Opposed Feed Miller

A DOUBLE spindle, opposed feed miller has just been introduced by Kent-Owens Machine Co. of Toledo. Particularly adapted, in the automotive industry, to the slitting of skirts of aluminum alloy pistons, for which, it is stated, the miller has a capacity of from 600 to 1000 pistons per hour. It is fitted with two heads which feed toward each other and balance each other, feed being through a rack and pinion arrangement. Head and table movements are equipped with adjustable stops. Spindle drive is through a splined shaft and spiral bevel gears mounted on ball bearings. A heavy flywheel is provided for smooth operation.



Kent-Owens double spindle, opposed feed miller

Timken taper roller bearings are used for the spindle and backshaft mounting. High safety factors in construction are evidenced by the deep column sections. A coolant tank is cast integral with the base. Working surface is 22 in. long, 5 in. wide, with standard $\frac{5}{8}$ -in. T-slots. Distance between spindles ranges from a minimum of 4 $\frac{3}{4}$ in. to a 12 $\frac{1}{2}$ -in. maximum. There is a 4-in. hand lever horizontal table feed and 17 in. by-crank. Cross-saddle feed is 5 in.

The cone pulley has two steps, 10 in. and 7 in. in diameter by 3 $\frac{1}{2}$ -in. face, 10-in. pulleys, tight and loose, being mounted on the countershaft. A 3 to 5 hp. motor, either with belt or direct drive is recommended for average service. Coolant pump equipment is supplied at extra cost.

Airports Need Facilities

A VISION of airports which would combine air, rail and water terminal facilities, hotels, restaurants, amusement places, and which would be the principal municipal center, was given to those present at the May meeting of the Pennsylvania Section of the Society of Automotive Engineers in Philadelphia last week. The meeting, which combined the S.A.E. with the Aero Club of Pennsylvania and the Aircrafters Club, heard Francis Keally, terminal architect, Columbia University, discuss modern airport design and E. A. Johnson, president, Johnson Airplane Supply Co., Cleveland, talk about airport operation.

Mr. Keally emphasized the point that the development of air transportation has been so rapid and is still moving forward so fast that it becomes almost impossible to predict conditions even 10 years hence.

In general, Mr. Keally believes that the largest airport is the best, although some discussion was brought out in connection with the development of planes of the Auto-Giro types, which permit vertical take-offs and landings or, at least at much greater angles than is possible with ordinary planes. Major airports should be located along waterways if possible, Mr. Keally believes, as he thinks that the use of amphibians will increase considerably in the future.

Chevrolet Foundry Methods Contribute To Saving in Scrap and Labor Cost

Design of overhead valve mechanism, while not favored by low cost, assists in the reduction of noise, according to Alex Taub, research engineer

IN a paper recently read before the Metropolitan Section of the S.A.E., Alex Taub, research engineer of the Chevrolet Motor Co., touched upon various features of the new six-cylinder Chevrolet that have not been covered in these columns previously. One relates to the cylinder castings. It was pointed out that while

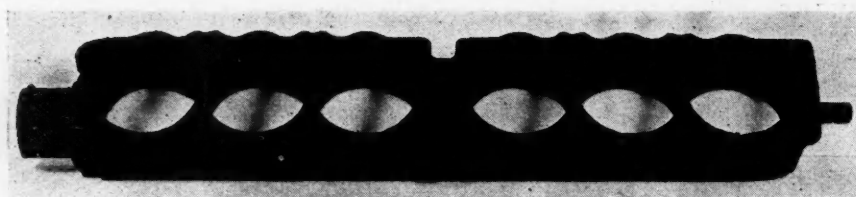


Fig. 1—Cylinder jacket core used for Chevrolet six engine castings

at the cupola spigot iron may cost only 2 cents per pound, the completed casting costs from 4 to 7 cents per pound, the difference being due to the labor and burden involved in molding, cleaning castings and scrap. If the walls of a cylinder block are made unusually thin, some weight may be saved, but it is probable that the cost will be increased, on account of the increased scrap. If the casting necessitates complicated molding, the cost is increased without gain, except in scrap hazards. If weight is added it should be added in such a manner as to simplify molding and reduce scrap. If metal is added without any change in the operations between cupola and final casting, then it can be added at cupola prices.

Owing to the fact that the temperature of the iron around the exhaust valve attains 500 deg. F. while around the inlet valve it is only 200 deg. F., it is necessary to carry the water-jacket through between the two seats. Powerplants in which there is no water-jacket between valves are in use today, but it is impossible with that construction for the engine to maintain its performance after a period of hard driving.

If sustained performance is desired, when determining the engine length, provision must be made for valves, port metal and water. The water space allowed, moreover, must be sufficient to enable the foundry to produce it at minimum cost and with certainty.

Uniform expansion is essential also in the cylinder barrels, and in the Chevrolet engine adjacent cylinder barrels are separated by a water space. Siamesed cylinder barrels are now almost a thing of the past. But if water space is provided for, it must be large enough

to insure that uniform expansion will be obtained.

Fig. 1 illustrates a development in foundry work designed to assure that the barrels will be completely surrounded with water. It illustrates the one-piece water jacket core used for producing the Chevrolet six engine, the core box being split at the top. The usual practice is to split this core box on the cylinder center line (see Fig. 2), making a joint at the thinnest part of the core, the result being fins in the casting where they will do the most harm.

The new Chevrolet engine continues the overhead valve location, the reasons for its choice being that it makes possible a high volumetric efficiency, improves the manifolding and makes the adjusting mechanism

very accessible.

Mr. Taub pointed out that the overhead valve gear is not favored by low cost but that "it does represent a high utility per dollar set up," by which he evidently meant that while it costs somewhat more it is worth it. The volumetric efficiency is greater than that of

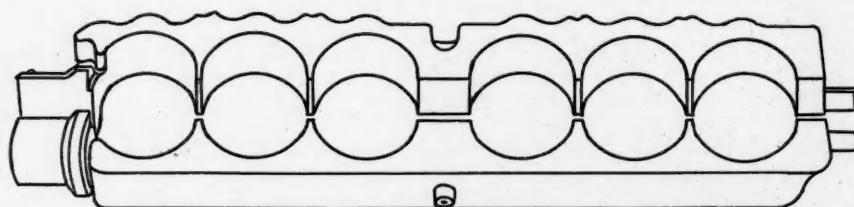


Fig. 2—General form of jacket core ordinarily used for overhead valve engines.

other types because the passages are less tortuous. The manifolding is better because the inlet tract slopes down toward the valves on the whole, and there is therefore no opportunity for pools of liquid fuel to accumulate.



Fig. 4—Showing difference in length of valve stem guide bosses for inlet and exhaust valves

The accessibility of the valve mechanism in a valve-in-head engine is quite pronounced, and Mr. Taub empha-

† Idle.
‡ Cold.

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News Industry

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NUMBER 20

Production Continues High in Low-Priced Car Group

PHILADELPHIA, May 18—While heavy production schedules are being maintained by a large number of automobile manufacturers, especially those producing cars in the lower priced group, there are indications that the May output is not likely to reach the all-time record established last month when the factories turned out 633,424 cars and trucks. The opinion is not uncommon among students of production trends, however, that a new record for the month of May will be established this year.

With the normal seasonal peak of sales at hand, manufacturers are watching the situation in the field closely, and are preparing to adjust their production schedules to fit the market. Retail sales continue generally favorable, according to several sales executives of automobile companies, and improved weather conditions in many sections of the country are expected to brighten the outlook.

New car stocks continue to be spotty, although reports from various parts of the country show them as about two per cent lower than a month ago. While in some sections they are admitted to be greater than usual, there are reports from other parts of the country that stocks of makes having met with unusual reception are below normal. In addition to watching closely retail sales and new car stocks, executives are giving considerable attention to the used car situation.

Reports reaching the factories indicate a strong movement in cars of this class. Stocks of used cars, however, have been considerably increased, especially in those sections of the country reporting heavy new car sales, as a result of trade-in transactions. Dealers are cooperating with the factories in keeping such stocks turning as rapidly as possible.

Automotive Fibre Plant to Build Detroit Branch

OAKLAND, CAL., May 15—The National Automotive Fibres, Inc., will establish a branch factory at Detroit immediately, it was announced here today. John R. Millar, treasurer of the corporation and vice-president and general manager of the California Cotton Mills Co., stated today that he will leave Oakland June 1, for Detroit to let the contract for erecting the new plant there.

Houdaille-Hershey to Propose Merger

DETROIT, May 16—The Stockholders of the Houdaille-Hershey Corp., at a special meeting today, authorized an increase in the capital structure of the company to 1,500,000 shares of no par value stock to be divided into 500,000 shares of Class A and 1,000,000 shares of Class B stock. The stockholders also authorized the directors to issue all or any part of the additional stock, whether A or B, for the acquisition of stock or property of other corporations.

The directors voted that an offer be made to the stockholders of the General Spring & Bumper Corp. for an exchange of stock, whereby one share of Houdaille-Hershey Class A would be given for one share of corresponding stock in the other concern with a similar exchange of Class B stock. Such an offer, it was stated, would become effective upon the distribution of a stock dividend to be paid by the General Spring & Bumper Corp., equal to 50 per cent of its outstanding A and B stock, on June 3 to stockholders of record May 27, as authorized by the stockholders of that company at their meeting May 15. General Spring & Bumper stockholders also voted to increase their authorized capital stock to 373,479 shares, to be divided into 90,000 shares of Class A and 283,479 shares of Class B stock.

A committee including: C. L. Barnes, C. E. Allington, P. H. Davis, Charles Getler, M. B. Ericson, M. C. Mason, was appointed by Houdaille-Hershey to work out plans of the Houdaille-Hershey company's offer, the details of which are to be made in a few days.

April Employment Showed Increase

WASHINGTON, May 15—Increased activity of automobile manufacturing plants is shown in the report of April employment made public this week by the Department of Commerce. Employment in manufacturing industries generally showed an increase in April this year for the first time since 1921. Thirty-nine of the 54 manufacturing industries had more employees last month than in the same month last year. The outstanding increase was in machine tools. The automobile industry showed an increase of between 25 and 30 per cent.

It was announced today that Class B Houdaille-Hershey stock had been listed on the New York Stock Exchange.

Auburn Appoints McDarby to Fill New Sales Post

AUBURN, IND., May 15—R. H. Faulkner, vice-president of the Auburn Automobile Co., has announced the appointment of N. E. McDarby to the newly created position of director of sales. H. L. Brinck, formerly supervisor of district sales managers, has been appointed to fill the position of sales manager of the Auburn division of the company. Mr. McDarby has been with the company for five years. Mr. Brinck joined the company late in 1928.

New Era to Name Personnel

NEW YORK, May 16—Following a meeting of New Era Motors, Inc., here yesterday, it was made known that officers and directors of the company which is to manufacture the front-wheel drive Ruxton car will be named next week. It was learned this week that William V. C. Ruxton, a partner in the firm of Spencer, Trask & Co., bankers and brokers, 25 Broad St., is interested in the project of which A. M. Andrews is the head. Mr. Ruxton is a member of the governing committee of the New Stock Exchange.

Chevrolet Promotes Five Staff Members

Advancements Follow Trans- fer of Executives by General Motors

DETROIT, May 15—Promotion of five important members of the executive staff of the Chevrolet Motor Co. was announced today by William S. Knudsen, president. The promotions followed the annual election of General Motors Corp. last week when R. H. Grant, formerly vice-president in charge of sales of Chevrolet, was elected a vice-president of General Motors and added to the general staff. At that time also O. E. Hunt, chief engineer of Chevrolet, was elected a vice-president of General Motors and transferred to the general staff of the corporation, and Mr. Knudsen was named a member of the executive committee of General Motors.

H. J. Klingler succeeds Mr. Grant as vice-president and general sales manager of Chevrolet. Previous to the appointment, Mr. Klingler was general sales manager of Chevrolet, to which post he had been appointed some months ago when Mr. Grant was raised from general sales manager to vice-president.

James M. Crawford has been appointed chief engineer to succeed Mr. Hunt. Mr. Crawford entered the Chevrolet organization a year ago from Auburn, where he had held the post of chief engineer.

Charles F. Barth, who has held the position of vice-president in charge of manufacturing, has been named vice-president and general manager of manufacturing. He was made general manager of Chevrolet in 1918, and since 1924 has been a vice-president and in charge of all Chevrolet manufacturing.

Leroy V. Cram, who has been an engineer of the company at the Flint plant, has been made assistant chief engineer and will be transferred to Detroit, and Marvin E. Coyle, who has been assistant to the president of Chevrolet, has been made vice-president and general auditor of the company.

White Promotes Avery

DETROIT, May 14—L. G. Avery, manager of the sales promotion department of The White Co. since 1926, has been promoted to the managership of the Detroit district, according to an announcement from the office of George Russell, vice-president of the central region. Walter A. Maynard, transportation engineer, has been appointed sales promotion manager.

Bower Succeeds DeWaters

DETROIT, May 15—F. A. Bower has been named chief engineer of the Buick Motor Co., succeeding E. A. DeWaters. Mr. Bower, who has been a member of the Buick engineering staff for a number of years, previously held the title of assistant chief engineer. It is understood that Mr. DeWaters hereafter

will act in an advisory capacity. Mr. Bower is a graduate of the Engineering School of the University of Michigan, class of 1912.

Soviet Beginning Five-Year Project

DETROIT, May 15—The \$4,000,000 tractor plant which will be built by the Russian Government at the mouth of the Volga in South Russia is the beginning of a five-year industrial development plan involving a sum that will exceed \$100,000,000, according to Moritz Kahn, vice-president of Albert Kahn, Inc., Detroit architects who have been engaged to design the tractor factory.

Besides the Stalingrad plant, which will have an annual capacity of 40,000 tractors, the government plans a motor car factory capable of producing 100,000 units annually, and a motor truck plant with an annual production of 10,000 three-ton trucks, besides other factories of similar character. In addition to these, the five-year program contemplates the construction of buildings for various other industries.

Roosevelt No. 10,000 Out

INDIANAPOLIS, May 15—Roosevelt car No. 10,000 was shipped from the Marmon factory today and was included in a large shipment of Marmon Models 68 and 78 and Roosevelt cars to Detroit. The factory is being operated on a capacity schedule. Today marks the fifth anniversary of G. M. Williams as president of the Marmon company.

Plane Exports \$3,664,723

WASHINGTON, May 16—Exports of airplanes, airplane parts and engines from the United States last year had a total value of \$3,664,723, nearly equaling the total value of exports for the three years 1925-27, which amounted to \$3,714,429, according to the Department of Commerce.

Masury Registered on Graf

NEW YORK, May 14—A. F. Masury, vice-president and chief engineer of International Motor Truck Co., who has been in Germany studying Diesel engine development, is among those registered for return to this country aboard the dirigible Graf Zeppelin.

Graham-Paige Reports Net

DETROIT, May 16—The Graham-Paige Motors Corp. reports a net profit of \$931,532 for the four months ending April 30, after all charges including Federal taxes. Of this amount, \$407,890 was earned in April.

Jordan Earns \$41,723

CLEVELAND, May 15—The Jordan Motor Car Co. announces net profit for April as \$41,723, after all charges including the inauguration of new advertising. Current assets April 30 were \$1,805,090 and current liabilities \$249,645.

Business in Brief

Written by the Guaranty Trust
Co., New York, exclusively for
AUTOMOTIVE INDUSTRIES.

NEW YORK, May 16—The continuation of the cool and wet weather last week further retarded spring trade and the growth of grain and cotton. Business in general, however, remains at a high level. The distribution of commodities is running along smoothly, and there is a noticeable absence of adverse factors such as car shortages, strikes, large inventories, and commodity price inflation.

FREIGHT CAR LOADINGS

Railway freight loadings for the week ended April 27 totaled 1,051,728 cars, which marks the second time this year that railway freight loadings surpassed the million-car mark in any one week. This total shows increases of 47,527 cars over the preceding week and of 83,721 cars over that for the corresponding week last year.

FISHER'S INDEX

Professor Fisher's index of whole-sale commodity prices for the week ended May 11 stood at 95.7, which compares with 96.7 both for the week before and two weeks before.

FEDERAL RESERVE REPORT

The consolidated statement of the Federal Reserve banks for the week ended May 8 shows a very slight contraction of credit. There were decreases for the week of \$23,800,000 in holdings of discounted bills, of \$13,200,000 in holdings of bills bought in the open market, of \$1,200,000 in holdings of Government securities, and of \$5,800,000 in member bank reserve deposits. The Reserve ratio on May 8 was 74.3 per cent, as against 73.3 per cent a week earlier.

Floyd A. Allen Marries

DETROIT, May 15—Floyd A. Allen, of Flint, assistant to the president of the General Motors Corp., and Mrs. Florence Kean Phipps, of Detroit, were married in this city today. Charles S. Mott, vice-president of General Motors, acted as best man.

Fruehauf Appoints Snyder

DETROIT, May 16—H. E. Snyder, who for the last 13 years has been associated with the Federal Motor Truck Co., has been appointed general factory superintendent of the Fruehauf Trailer Co.

Federal Screw Building

DETROIT, May 16—The Federal Screw Works is preparing to construct an addition, 75 by 100 ft., to its Detroit plant, to provide for added production capacity of 35 per cent. It is planned to install several new departments including an airplane parts division. The company also contemplates an addition to its plant at Chelsea, Mich., to increase the output of that branch by 25 per cent.

Ford Buys Tract for Export Plant

Project at Edgewater Will
Replace Kearney Unit
as Overseas Depot

NEW YORK, May 14—The Ford Motor Co. has just completed a deal for the purchase of land along the west bank of the Hudson River, opposite One-hundredth Street, Manhattan, where it will erect an assembly plant for the export market. The cost of this site is said to be approximately \$1,250,000.

The location of the plant is such that ships can load directly from the plant to carry cars and parts to the export market. The tract, which comprises 30 acres, has a deep water frontage 820 ft. long at which the largest ships will be able to take on cargo.

It is said that when the plant is completed it will comprise one of the largest industrial units in the East. It lies immediately adjacent to the freight terminal of the New York, Susquehanna & Western division of the Erie Railroad, thus affording not only adequate water shipping facilities but rail facilities as well. It is within the free literature limit zone.

William A. Francis, eastern branch manager of the Ford Motor Co., now located at Kearney, N. J., stated that this new Edgewater plant will eventually supersede the Kearney plant as the main export depot of the Ford Motor Co.

Harris Transferred to Chester

CHESTER, PA., May 14—A. M. Harris has been made superintendent of the Ford assembly plant here. Mr. Harris was formerly superintendent and body engineer of the Ford plant at Somerville, Mass. Concentration of export facilities at the Chester plant, which has been under way since early this year, is about at the maximum. Berthing and loading facilities for three first line ships of the Ford fleet are maintained.

Permit Granted for Plant

LOS ANGELES, May 16—Issuance of a new building permit for a \$490,000 solid concrete pier on Cerritos Channel and awarding of contracts for the \$1,240,000 construction work for which permits have now been issued are the most recent activities in the erection of the new Ford Motor Co. plant at Los Angeles-Long Beach harbor.

Contest Has 127 Mufflers

BERLIN, May 8—The German Muffler Contest Committee has announced that it has received entries from 67 firms which have entered a total of 127 mufflers. While entries at regular rates closed on April 1, additional entries at a slightly increased fee were accepted up to May 1. All models must be sent in for the tests during the period from

June 1 to Sept. 1, and the tests will be begun as soon as the models arrive. Entries were received from firms and individuals in Germany, Denmark, Italy, Austria, Switzerland, Czechoslovakia and Hungary.

Diesel-Engined Airplane Flies to N.A.C.A. Event

NEWPORT NEWS, VA., May 14—Demonstration of an airplane powered by a Packard Diesel engine featured the fourth annual conference of the National Advisory Committee for Aeronautics. The plane, a Stinson-Detroiter, was flown from Detroit to Langley Field in approximately seven hours. Capt. L. M. Woolson and W. E. Lees of the Packard Motor Car Co. demonstrated the plane to the satisfaction of the delegates, but refused to discuss the technical details of operation.

Captain Woolson reported that for the 700 miles flown the engine showed a saving of 80 per cent in cost of fuel over the average plane, and that the saving in weight of fuel carried had been 40 per cent.

Harold F. Pitcairn, president of Pitcairn Aviation, Inc., landed at Langley Field after a solo flight from the Pitcairn factory at Bryn Athyn, Pa., in a Cievra Autogiro, for which he holds American manufacturing rights. The flight of approximately 120 miles was the longest sustained flight attempted by an Autogiro in this country, and was made possible in time for the aeronautics conference by the work of Pitcairn engineers who have been experimenting on the giro for several months.

Hoover Committee Sees Prosperity for Future

WASHINGTON, May 15—A future increase in the prosperity of the United States provided that the principle of equilibrium is applied in every economic relation is predicted by the report of the Committee on Recent Economic Changes, published yesterday in book form and released by the Department of Commerce in pamphlet form.

The report, made to the president's Conference on Unemployment, is signed by Mr. Hoover, and among the names of the prominent business executives attesting is that of John J. Raskob, representing the automobile industry. The report is based on investigations made by the National Bureau of Economic Research for the committee.

To Open Australian Plant

WASHINGTON, May 16—The Department of Commerce was informed this week that the Clyde Engineering Co. and the Australian National Airways have formed an aircraft company to be known as the Clyde Engineering-National Airways, Ltd., which will soon commence production of airplanes. The plant will be located at Sydney, Australia.

Bendix Aviation Names Personnel

Organization Details Under-
taken at Meeting; Beecroft
Added to Directorate

NEW YORK, May 14—The Bendix Aviation Corp. held an organization meeting yesterday at which the final details of organizing a new corporation were concluded. A number of routine matters in connection with the organization of the new company came up and contracts of the component companies were confirmed.

The following officers were elected: Vincent Bendix, president; W. L. O'Neill of Stromberg Carburetor Co., and W. L. McGrath of Eclipse Machine Co., vice-presidents; H. A. Gossner, secretary; H. C. Hartman and M. Carr, assistant secretaries; W. J. Buettner of Bendix Brake Co., treasurer; H. A. Gossner, assistant treasurer, and W. H. Houghton, comptroller.

All the directors whose names were contained in the original announcement of the Bendix Aviation Corp. were elected, with the addition of David Beecroft, vice-president of the Bendix Corp. and former vice-president of the Chilton Class Journal Co.

The committees appointed were: Executive committee: Vincent Bendix, chairman; C. E. Wilson, W. L. O'Neill, W. L. McGrath and W. J. Buettner. Financial committee: Albert Bradley, chairman; W. J. Buettner, Richard . . Hoyt, Paul H. Davis, Vincent Bendix and C. O. Miniger.

English Firm Announces Automatic Car Lighter

LONDON, May 9—A device for automatically switching on the lights of an automobile that has been left in the street unattended has been developed in England by Setalite, Ltd., London. The instrument is about the size of a speedometer and can be fitted to the dash or in any other convenient position; it comprises a dial on which time intervals of 15 minutes over a range of 6 hours are graduated.

The dial can be turned by means of a knob, so that the length of time from the moment the instrument is set to the lighting-up time appears opposite a pointer, and when that time has elapsed the lights are switched on automatically. No current is required for the operation of the instrument, nor is any winding required aside from that necessary to set it. The instrument does not interfere with control of the lights by the regular switches.

Opel Plan Reported

BERLIN, May 7—The management of the Opel Works in Russelsheim is said to be planning to remove the general offices to some large city, consideration being given to Mainz, Wiesbaden and Frankfurt-on-Main.

Industry Continues Demand for Steel

Recession of High Pressure is
Foreseen for June,
However

NEW YORK, May 16—Current operations of finishing mills catering to automotive consumers of steel continue virtually at capacity, but June specifications so far in hand indicate that easing off in the high pressure demand is in sight. For the present, however, a tight fit between the supply of sheet bars and the requirements of non-integrated rollers, as well as those of the sheet mills of the self-contained producers, continues. The tonnage which makers of full-finished automobile sheets have on their order books is such that on some new business they name July and even August as earliest delivery periods.

There has been some talk of price advances on sheets for the third quarter, but, considering the heavy demand which has prevailed for some time, the market, with the exception of full-finished body stock, is not as uniformly strong as one would expect it to be under these conditions. If prices for third quarter are marked up, it is thought that, like so often before, the real object will be to drive out orders at old prices. Strip mills are still considerably behind on deliveries of fender stock, but they are gradually cleaning up on overdue shipments. Small tonnages for new models have been placed to be followed by larger orders when schedules for quantity production are formulated.

The market for both hot and cold-rolled strip is firm. Cold-finished steel bars are being called for at a good rate by automotive consumers. On the basis of data just made public by the American Iron & Steel Institute, showing an output of more than 3,000,000 tons of alloy steel last year, an increase of 27 per cent over 1927 and constituting approximately 6¼ per cent of the entire steel output, it is estimated that as the result of the excellent demand for automotive alloy steels during the first half of this year, close to 4,000,000 tons of alloy steel will be produced in 1929. An increase of more than 20 per cent in the 1928 output of electric steel over that of the preceding year is indicative of the growing demand for high-grade steel by the automotive industries and this, it is expected, will result in a 1929 electric steel output that for the first time is likely to pass the 1,000,000-ton mark.

Pig Iron—Shipments to automotive foundries against contracts are heavy. The Valley market is stronger on a basis of \$18.50 for foundry and \$19.00 for malleable, lower prices than these having disappeared. The Detroit market continues firm at \$20.50 for foundry and \$21.00 for malleable.

Aluminum—Stocks in bonded warehouses have been whittled down, being approximately 6,000,000 lb. at the beginning of

Car Output Boosts Aluminum Industry

WASHINGTON, May 16—The high production of automobiles last year contributed to the increase in the value of this country's aluminum output, according to a statement issued this week by the Bureau of Mines. Last year's aluminum production had a total value of \$47,899,000, says the statement.

April as compared with nearly twice that tonnage earlier in the year. London advices report that some of the members of the European Consortium are urging price advances, but that the German producers are averse to such a move. It is said that the views of the American producer are being sought in this connection. The market remains unchanged and firm.

Copper—Trading in copper began on the National Metal Exchange this week. While the speculative public is showing considerable interest in this innovation through Wall Street commission houses, trade support by reason of the opportunity for hedging operations is looked for as the main prop. The statistical position of the market is easy, quotations being unchanged.

Tin—The tin market continues to seesaw from day to day, but on the whole the tendency appears to be upward.

Lead—More active demand from consumers who have not yet fully covered their May and June needs is looked for by refiners.

Zinc—Quiet and easy.

Mather Spring to Build

TOLEDO, May 15—The Mather Spring Co. has announced preliminary plans for the construction of a bumper plant in the northern part of this city, at a cost of about \$1,000,000. Negotiations for the site, now owned by railroad interests, are not completed, but Gordon M. Mather, president of the company, said that construction would be started promptly and that the plant probably would be finished this year.

Whittelsey Elects Crouch

NEW YORK, May 14—R. J. Goodman Crouch, aeronautical designer of England, has been elected vice-president and chief aeronautical engineer of the Whittelsey Mfg. Co. of Bridgeport, Conn., licensed for the American construction of the Avro Avian airplane.

Discusses Argentina

NEW YORK, May 11—An urgent plea for greater understanding and co-operation in the problems of local merchandising in Argentina on the part of American manufacturers was requested by John A. Maranz, Argentine distributor for a number of automotive products, at the regular monthly meeting of the Overseas Automotive Club held at Hotel Astor this week.

Willys-Overland Reelects Officers

President Willys' Annual Report Denies Changes in
Organization

TOLEDO, May 14—Stockholders of the Willys-Overland Co. at their seventeenth annual meeting here this afternoon reelected all directors and officers of the company. In his annual report President John N. Willys told the meeting that he has "taken no steps to sell my stock or to change my relationship with the company in any way," and that he had no plans to change the personnel, capital structure or organization.

Distribution of stock holdings as voted at the meeting indicated to Mr. Willys that there had been no important change in the ratio of large personal holdings during the past year. Continued discussion of the point was brought out because of Mr. Willys' statement in his report that "There have been many unauthorized reports appearing in the press lately that I am selling out my interests in the company and resigning from the presidency."

The directorate of the Willys-Overland Co. now includes John N. Willys; L. A. Miller, first vice-president; George M. Graham and Colin Campbell, vice-presidents; J. H. Gerkens, vice-president and treasurer; A. B. Qualy, secretary, and W. E. Miner, comptroller. The executive committee remains with Mr. Willys as chairman, and Directors Miniger, Jones, Fuller and Mather as members.

An exhibit of the complete Willys-Overland line was a feature of the meeting, and it was announced that the new Willys-Knight Great Six would be ready for the public in a few weeks.

Bendix Interests Buy Cowdrey Brake Tester

NEW YORK, May 14—Interests backing the recently organized Bendix Aviation Corp. have purchased the Cowdrey Brake Tester Organization, Inc., Fitchburg, Mass., manufacturer of dynamic brake tester machines, and have organized the Bendix Cowdrey Brake Tester, Inc., to handle the manufacture, sales and other business of the Cowdrey organization. Headquarters of the new company will continue in Fitchburg for some time and manufacture, sales and service will center at this point.

Bendix-Cowdrey Brake Tester, Inc., will become an affiliated company of the Bendix Aviation Corp., with Charles F. Cowdrey, Sr., who developed the Cowdrey brake tester equipment, as honorary vice-president.

"All of the brake testing patents, applications, etc., belonging to the Bendix Corp., will be combined with those of the Cowdrey organization," says the statement of Vincent Bendix.

Glancy and Reuter Retain Same Jobs

Olds and Oakland Heads to
Continue at G.M. Di-
visional Posts

NEW YORK, May 14—With the announcement last week of additions to the number of vice-presidents of General Motors Corp., there went into effect a number of changes in the staff organization of that company. A. R. Glancy and I. J. Reuter were elected vice-presidents to complete the list of General Motors divisional managers occupying the positions of vice-presidents of the corporation. With Mr. Glancy representing Oldsmobile and Mr. Reuter representing Oakland, the presidents of all the car manufacturing divisions are now vice-presidents of the corporation. These two men will continue their duties with their respective divisions.

R. H. Grant, who was formerly in charge of Chevrolet sales, has now become vice-president of the corporation and chairman of the sales managers' committee and he will be very active in general sales activities. While no statement was made at General Motors headquarters, it is understood that he will direct the sales policies of the various divisions. O. E. Hunt, also of Chevrolet, was elected vice-president and succeeds Alfred P. Sloan, Jr., as chairman of the technical committee.

C. E. Wilson of the Delco-Remy Corp. was elected vice-president and becomes chairman of the works managers' committee. Albert Bradley, formerly assistant treasurer, was advanced to the position of vice-president in recognition of the service he has rendered in his capacity in the treasurer's office. His duties will virtually remain unchanged.

Credit Committee Plans for Growth of M. & E.A.

NEW YORK, May 15—The Special Credit Committee of the Motor & Equipment Association held an all-day session in Detroit today to outline plans for the expansion and development of the association. The committee consists of the following men: J. M. McComb of Crucible Steel Co. of America, chairman; M. A. Moynihan of Gemmer Mfg. Co., secretary and treasurer; G. B. Shearer of Gaul, Derr & Shearer, W. A. Albaugh of Thompson Products, Inc., and M. L. Hemmingsway and A. H. Fagan, managing director and association credit manager, respectively, of the M.E.A.

Selden Adds Chassis

ROCHESTER, N. Y., May 14—The Selden Truck Corp. is marketing a new 2½-3-ton truck chassis, Model 39C. It is fitted with a 6-cylinder, valve-in-head, 4 by 4½ in. engine, Lockheed internal four-wheel brakes and a four-speed transmission. The chassis is built

in four wheelbase lengths giving loading spaces 9, 10, 12 and 14 ft. long. For dump work it can be equipped with a 2½-yd. body with underbody hoist.

Standard equipment includes a generator, starter, electric horn, head and tail lights, ammeter, battery, oil gage, speedometer, spare rim, fenders, running boards, splash aprons, etc.

Skinner Co., Ltd., to Have Factory in Oshawa, Ont.

OSHAWA, ONT., May 14—The Skinner Co., Ltd., manufacturer of automobile accessories, will locate immediately in Oshawa, according to F. J. Skinner, president, of Gananoque, Ont. The company has purchased eight acres of land in this city and will erect as its first unit a plant 400 by 100 ft. in size.

The Skinner company has for some years been manufacturing automobile bumpers in Gananoque, supplying the general automobile trade, and has become the largest manufacturer in Canada of bumpers.

It is reported in this city, unofficially, that the Skinner firm is linking up with a large United States concern making general automobile accessories, and that the Oshawa plant will become the Canadian branch for this concern.

German Tax Group Plan Return Trip for June 1

NEW YORK, May 17—Dr. A. Allmers, general director of the Hansa Lloyd Works, Bremen, Germany, who represented the German automotive industry on the commission now in this country to study the operation of the American gasoline tax, sailed today on the S. S. Columbus of the North German Lloyd Line to return to Germany.

Before sailing he stated that the commission, as a result of the courtesy extended it at the various points visited and the aid of the National Automobile Chamber of Commerce, is returning with a very clear and definite idea as to the American method of taxation. It has obtained a vast amount of data which will enable it to arrive at some sort of conclusion as to the most suitable form of revised tax laws in Germany.

The other members of the commission are still visiting in this country and will return to New York May 30, sailing for Germany June 1.

Bartlett Joins Lencke

NEW YORK, May 14—Announcement is made that M. W. Bartlett, former president and general manager of the Splittorf-Electrical Co., Newark, N. J., has become associated with J. K. Lencke, president of the Apollo Magneto Corp., Kingston, N. Y.

W. T. Rogers Killed in Blast

CLEVELAND, May 16—W. T. Rogers, in charge of export credits and collections of the White Motor Co., was among the persons killed yesterday in the blast occurring in the Cleveland Clinic.

Indiana Truck Adds Road-Builder Model

New Vehicle Has Six-Cylinder Engine, Gross Weight
Rating 20,000 Lb.

MARION, IND., May 13—Another road-builder model with a gross weight rating of 20,000 lb. has been added to the line of the Indiana Truck Corp. This chassis, known as Model 627AW, is powered by a 6-cyl., 4 by 5 in. valve-in-head engine and has a unit-mounted Brown-Lipe transmission which provides five forward speeds and two reverse. The standard reduction in low is 7.41 to 1, while the high speed is a direct drive. Alternately a transmission with a low-speed ratio of 5.96 to 1 direct-drive in fourth and over-drive in fifth may be furnished.

Standard equipment includes a Boyce Moto-Meter, 2-man seat, bumper, radiator guard, air cleaner, oil gage, oil filter, hand horn, tow hooks front and rear, rear vision mirror, extra wheel, etc. Electric lighting and starting equipment is furnished as extra equipment.

The cab, which is furnished as extra equipment, is of the de luxe type and is Tors-Elim 3-point mounted. It has full length doors with crank-operated sliding windows, a one-piece windshield of the full ventilating type and an automatic windshield wiper. The body, also furnished extra, is of the straight-side, round-bottom type, with double-acting tail gate and center partition.

G.M. Explains Earnings

NEW YORK, May 16—The condensed consolidated balance sheet of the General Motors Corp., as of March 31, shows net earnings, including equities of undivided profits of subsidiary and affiliated companies not consolidated, as \$61,910,987, as compared with \$69,468,576 for the corresponding period of last year. After deducting dividends on preferred and debenture stocks there remains \$59,559,217, or \$1.37 a share, as compared with \$1.54 a share for the first quarter of 1928.

Retail sales by General Motors dealers for the three months were 448,176 cars, as compared with 423,013 cars for the corresponding period of 1928. Cash, government and other marketable securities as of March 31, 1929, amounted to \$181,963,199. Bank loans were \$30,000,000.

Stewart-Warner Net Up

NEW YORK, May 15—Stewart-Warner Corp. and subsidiaries report net earnings for the first quarter of the current year after all charges of \$2,054,224 equal to \$3.42 a share on old stock outstanding March 31, and to \$1.68 a share on new stock now outstanding. This corresponds with earnings of \$1,337,284, or \$2.31 a share, for the corresponding quarter of last year.

Parts Makers Show Increased Earnings

Aggregate Gain of 76.4 Per Cent in Quarter Shown by 19 Firms

NEW YORK, May 14—The nineteen corporations engaged in the manufacture of automobile parts and accessories, which to date have reported first quarter earnings, showed an aggregate gain of 74.6 per cent over the corresponding three months of 1928. Income in the recent quarter totaled \$16,683,000 against \$9,556,000 in 1928.

The following compilation by the Standard Statistics Company of New York shows earnings for the two periods in thousands of dollars, together with the per cent increase:

	Thousands of Dollars		Per Cent
	1928	1929	Gain
American Bosch Magneto	71	223	213.1
Bohn Aluminum & Brass	818	1,020	24.7
Briggs Mfg. Co.	697	1,405	101.5
Budd (Ed. G.) Mfg. Co.	500	741	48.2
Budd Wheel Co.	152	554	264.5
Campbell, Wyant & Cannon	435	476	9.4
Eaton Axle & Spring	277	469	69.4
Electric Auto Lite	1,567	3,399	113.1
Marlin Rockwell Co.	451	703	55.8
Midland Steel Products	631	1,004	59.1
Motor Wheel Corp.	562	1,102	96.1
Mullins Mfg. Co.	151	164	8.6
Murray Corp. of America	392	785	100.3
Raybestos Co.	224	415	85.2
Ross Gear & Tool	139	246	77.0
Spicer Mfg. Co.	420	763	81.6
Stewart Warner	1,387	2,054	48.1
Willcox Rich	259	484	86.2
Young (L. A.) Spring & Wire	423	676	59.8
Totals 19 Corporations	9,556	16,683	74.6

New Windsor Model 6-69 to be Introduced Soon

ST. LOUIS, May 15—Introduction of the new Windsor Model 6-69, on a wheelbase of 120 inches, to list at \$1,095, will be made by the Windsor Corp., St. Louis, within the next two weeks, it was revealed today. The car in outward design follows closely that of previous Windsor models. It will be equipped with a Continental engine.

The Continental 37 L six-cylinder engine, fitted with Bohnalite pistons, has a bore and stroke of 2 1/2 by 4 1/4 in. and a displacement of 185 cu. in., its actual horsepower being 48 at 2800 r.p.m.

Autolite electrical equipment of the two-unit type is used, and a Stromberg carburetor is standard equipment. The transmission, made by the Warner Gear Co., has alloy-steel heat-treated gears and the main shaft mounted on annular ball bearings. The single plate clutch with flexible driven member is a Borg & Beck. Timken bearings are used throughout the axle assembly. The brakes are Lockheed hydraulics, acting internally on 12-in. drums, and are

fitted with a compensator. Front springs are 38 in. long and 2 in. wide; rear springs, 55 in. long and 2.4 in. wide. A Ross cam-and-lever steering gear with an 18-in. hard rubber wheel is factory equipment.

C. W. Burst, president of the company, announced today that prices on all models of the White Prince 8-82, with the exception of the seven-passenger sedan, have been reduced by \$50. This brings the price of the roadster to \$1,695 and that of the Victoria, cabriolet, coupe and five-passenger sedan to \$1,795.

Sparks-Withington Votes to Increase Its Common

DETROIT, May 14—Stockholders of the Sparks-Withington Co. of Jackson, at a special meeting voted to increase the common stock from 400,000 to 2,000,000 shares. The regular quarterly dividend of 75 cents per share and an extra dividend of \$1 per share applicable to the fiscal year ending June 30, 1929, together with a 300 per cent stock dividend, were declared. The cash dividends are payable June 29 to stock of record June 14, and the stock dividend is payable July 1 to stock of record June 17.

The regular 1 1/2 per cent dividend on convertible preferred stock also was declared, payable June 15 to stock of record June 5. The company has purchased an additional factory at Jackson and is building also a three-story addition to its radio plant.

Truck Plant Completed

WASHINGTON, May 16—A Buenos Aires dispatch to the Department of Commerce received this week states that Ballester and Molina, Argentine representatives for the Hispano-Suiza of Barcelona, have formed a company to be known as La Hispano-Argentina and have just completed a plant for the complete assembly of trucks which, exclusive of Ford, will be the first of its kind in Buenos Aires. The firm will undertake assembly for all South American countries, says the dispatch, and will start at once on a series of 350 trucks of 3 and 4 ton capacity.

Roland E. Muirhead

DETROIT, May 15—Roland Eugene Muirhead, service manager of the Pontiac branch of General Motors Truck Co., died May 12 from complications following an operation for appendicitis.

Fairchild to Have New Plant

MONTREAL, May 14—S. M. Fairchild, president of the Fairchild Airplane Mfg. Corp., Farmingdale, N. Y., was in Montreal a few days ago to attend the local aircraft exhibition and to complete arrangements for the purchase of property here and the establishment of a factory by the Canadian subsidiary of the company. The company will establish also an airport here.

Jordan Emphasizes Advertising Need

Says Such Expense Should Not Add to Cost of Car

CHICAGO, May 14—Edward S. Jordan, president, Jordan Motor Car Co. and chairman of the Advertising Committee of the National Automobile Chamber of Commerce, presiding over a two days' session of that committee at the Edgewater Beach Hotel here, today stated that wisely planned advertising is an essential of motor car merchandising. The present-day low cost of automobiles would be impossible without the aid of advertising, according to Mr. Jordan, whose subject was "Advertising—What Are You Going to Do About It?"

The idea that advertising cost means more expense to the product is fallacious in Mr. Jordan's opinion. The printed page as an optional and less expensive method of salesmanship makes unnecessary the introductory calls which would otherwise be necessary for the salesman, he said.

Other speakers were S. Baldwin (Diamond T), "Direct Mail Efforts"; Robert W. Swiss (Willys-Overland), "Our Experience With Dealer and Consumer Films"; H. G. Selby (Cadillac), "Is Foreign Language Advertising Profitable?"; Oscar T. Jackson (Reo) and Bryan Warman (Durant), "What is the Relationship Between Car and Truck Advertising?"; W. J. Mattimore (Chrysler), "What is the Present Status of Bootleg Advertising and Selling?"; Jean Carroll (Meredith Publishing Co.), "How Can We Get More Facts on the Farm Market?"

Pratt & Whitney Plans Erection of New Plant

NEW YORK, May 14—Pratt & Whitney Aircraft Co., subsidiary of United Aircraft & Transport Corp., plans the erection of a new factory expanding its floor space 500,000 sq. ft. It has acquired 600 acres of land in Hartford for this purpose and will erect a new factory this summer.

This factory will be devoted to the manufacture of Wasp and Hornet engines and Vought Corsair airplanes. Adjoining the factory a private airport, to be the eastern terminal of United Aircraft, will be provided. The land cost more than \$500,000 and factory, work and the erection of the airport will entail an expenditure of about \$5,000,000 additional.

Briggs Mfg. Elects Hund

DETROIT, May 14—The Briggs Mfg. Co. at its annual meeting elected H. E. Hund, president, vice-president and general manager, to succeed H. T. Maise, who resigned recently. All other officers and directors were reelected.

Men of the Industry and What They Are Doing

Adams is to Continue With Budd After Rest

Hugh L. Adams, first vice-president of the Budd Mfg. Co. and of the Budd Wheel Co., Philadelphia, has not resigned, as recent reports indicated, but will continue his association with the companies, after an extended vacation, it was announced this week. Mr. Adams has been feeling the pressure of work for some time, due to his increased executive duties following the expansion of Budd activities, and it seemed imperative that his vacation be extended beyond the allotted time, if he were to continue his active connection with the companies, it was explained.

It was also announced from the office of the Budd Wheel Co. that an agreement had been reached between the Kelsey-Hayes Wheel Corp. and the Budd Wheel Co. whereby all suits for Cowles wheel patents are to be dismissed. Complete release under all claims of past profits and damages is provided for both Budd and all of Budd's customers.

G.M. Appoints Cox

H. H. Henchel, general sales manager of General Motors Products (Truck and Coach Division), Ltd., Windsor, Ontario, has announced the appointment of Albert Cox, manager of the General Motors truck factory branch at Windsor, as manager of the new factory branch which is being opened in Vancouver, B. C.

Goodyear Names McFarland

Alfred F. McFarland, former manager of the Fargo, N. D., branch of the Goodyear Tire & Rubber Co., has been appointed managing director of the Goodyear Tire & Rubber Co., A. G., of Berlin, Germany. Mr. McFarland sailed recently to assume his new duties. He has been with the company since 1916.

Pfeffer Names Watts

C. A. Pfeffer, general manager of the St. Clair Rubber Co. of Marysville, Mich., has announced the appointment of W. A. Watts as director of sales, operating directly from the factory. The company has launched a plan to broaden its merchandising activities.

Moto Meter Names Barlow

A. E. Barlow has been appointed general sales manager of the Moto Meter Co., Inc. Mr. Barlow has been directing the sales of the company since Jan. 15.

Graham-Paige Appoints Elgin

B. W. Elgin has been appointed manager of the National Business Division of the Graham-Paige Motors Corp., in charge of fleet sales to national



Marcus T. Lothrop

Whose election as president of the Timken Roller Bearing Co., Canton, Ohio, was announced last week in Automotive Industries. He succeeds H. H. Timken, who becomes chairman of the board

accounts. Headquarters have been established at New York, in the New York Central Building. He succeeds Ralph W. Austin, who goes to Detroit to join the organization at the home office.

Rubber Group Elects Davis

Edward B. Davis, Jr., president of the United States Rubber Co., has been elected a director of the Rubber Manufacturers Association, Inc., to succeed C. B. Seger, resigned. The Manhattan Rubber Mfg. Co. of Passaic, N. J., has been elected to membership in this association.

Garces Expresses Opinion

While on a recent visit to Detroit, Paul Garces, who is in charge of all Hupmobile sales and distribution in South America, expressed the opinion that air transportation in South America is farther advanced and more widely patronized by business men than in the United States.

Ex-Cell-O Promotes Wise

Wm. F. Wise, formerly production engineer for the Ex-Cell-O Tool & Manufacturing Company, has been promoted to the position of sales manager. Previous to his position as production engineer, Mr. Wise was on the sales force.

E. F. Davis Speaks on Gears

E. F. Davis, metallurgist of the Warner Gear Co., recently read a paper on "Factors Influencing the Strength and Wear on Gear Teeth," before the Cincinnati chapter of the American Society for Steel Treating.

Rumely Explains Market for Cars in Australia

Adequate transportation is the chief problem being faced by Australians today, according to L. M. Rumely, vice-president and general manager of General Motors Export Co., who has returned to this country from a visit to General Motors operations in Melbourne, Sydney, Brisbane, Adelaide and Perth.

The automobile, motor bus and truck are making rapid strides to meet this end, according to Mr. Rumely. He indicated that American manufacturers of cars, trucks and buses have more severe competition for this market among themselves than they do from English manufacturers.

Mack Appoints Lierman

A. D. Lierman has been appointed advertising manager of the Mack-International Motor Truck Corp. Mr. Lierman has been acting as advertising manager for the company since the death of H. C. Bailey last July. His appointment includes the editing of the organization's sales magazine, "The Mack Bulldog."

Durant With Trust Firm

William C. Durant is a director of the recently organized Ungerleider Financial Corp., an investment trust, incorporated under the laws of Delaware. This new corporation will start business with a cash capital of \$25,000,000 and present plans call for a possible final financial structure of \$150,000,000.

Boynton in New Post

The Automobile Radio Corp. has announced the appointment of F. W. Boynton as manager of the Detroit branch with offices at the factory, 1475 East Grand Blvd. For ten years Mr. Boynton was purchasing manager of the Packard Motor Car Co.

Curtiss Names Peper

Walter S. Peper has joined the sales division of the Curtiss Flying Service, Inc., in the capacity of regional sales director. He will be in charge of airplane sales for New York and New Jersey with headquarters at the new Curtiss Flying Service office at 27 West Fifty-seventh Street, New York City.

A. C. C. Names Johnson

Lyman H. Johnson, who assisted Clifford W. Henderson in the management of the National Air Races at Los Angeles last year, has been named to assist Mr. Henderson in the direction of the recently created show section of the Aeronautical Chamber of Commerce.

G.M. Truck Shows Increase in Sales

Gain in First Four Months is
22 Per Cent Over
Last Year

DETROIT, May 14—Sales of General Motors Truck Co. products continue to increase and reports for the first four months of the year reveal new high records. Sales of Yellow coaches during the first four months of this year were 22 per cent greater than in the same period of 1928, and were in excess of 5000 units. On May 1 the company's coach division had on hand unfilled orders for 500 coaches.

The total export business of the company for the first quarter of 1929 showed an increase of 169 per cent over the first quarter of 1928. During the first four months the total units sold for export trade were 4025. During the first quarter domestic truck sales increased about 18 per cent and the total improvement in truck sales for the first quarter was \$2,125,000 or about 45 per cent. The largest gains in truck sales were in the light delivery group, where a 100 per cent gain was made, and in the heavy duty trucks which made a gain of 600 per cent.

Growth of G.M. Truck export business is shown by the following figures:

Year	Sales	Increase
1925	527	
1926	690	
1927	1622	135 per cent
1928	6379	293 per cent
1929	4025	(first 4 months)

New Yellow Cab Models Will be Shown in June

PONTIAC, MICH., May 14—P. H. Geyser, vice-president in charge of the taxicab division of the General Motors Co., has announced that pre-showings of new Yellow Cab models will be made early in June. This announcement, said Mr. Geyser, is his company's reply to rumors that the manufacture of Yellow Cabs would be discontinued.

"Our first formal public showing will be made during the meeting of the National Association of Taxicab Operators in Chicago, June 26-28," Mr. Geyser stated, explaining that the new vehicles, which will be in production by July 1, were the first of this type to be designed in the new plant in which the company has just completed its first year of operation.

Brockway to Choose Site

ATLANTA, May 13—The Industrial Bureau of the Atlanta Chamber of Commerce has made known that, while it has been officially announced by the Brockway Motor Truck Corp. that the company would establish a plant in Atlanta for the assembling of Indiana trucks, operating as a unit of the Indiana Truck Corp., subsidiary organization of the Brockway concern, no defi-

nite action has as yet been taken by the company relative to a site for the plant. The minimum output of the new unit the initial year is expected to be 1000 trucks.

Timken Roller Building Second Unit of Factory

CANTON, OHIO, May 13—The Timken Roller Bearing Co. has broken ground on a new site for the erection of a second plant unit. The structure will be 100 ft. wide, and 800 ft. long. The cost was not stated by officials of the company. The first unit which was completed recently now is being partly operated and is expected to be in full operation soon.

A complete plant, consisting of several large units for the making of bearings, will be located on the new site, involving an expenditure within the next few years of approximately \$10,000,000, it is said. As one unit is completed and placed in operation another will be started immediately.

Production of automobile bearings at this time has reached a new peak, officials have announced.

Decrease of \$5,000,000 Shown in Ford Holdings

DETROIT, May 15—A decrease of \$5,000,000 in the assessed valuation of the Ford Motor Co.'s holdings in Dearborn, Mich., has been announced by Lysander T. Maples, chairman of the Dearborn board of assessors.

The new value is \$152,900,000 with personal property assessed at \$98,000,000 and real estate at \$54,800,000. Maples attributed the decrease to reduced production last year while the Model A was being developed.

Mexico Lifts Bars

WASHINGTON, May 16—All restrictions on shipments of commercial aircraft to Mexico have been removed, according to an announcement made this week by the State Department. Individual export licenses covering aircraft are no longer required, the announcement states.

To Study Car Thefts

WASHINGTON, May 16—A nationwide survey of automobile thefts and frauds was planned here this week by the committee on the detection and prosecution of crime, a standing committee of the National Crime Commission, at its first meeting.

Battery Preparation Invented

NEW YORK, May 14—Louis Gerber of this city has invented a preparation which is claimed to prevent the corrosion of storage battery terminals and to protect the hands from battery acid. All rights to the invention have been conveyed to the Boon Mfg. Co. of New York City, which will market the preparation under the name of Boonac.

Financial Notes

American LaFrance & Foamite Corp. reports net loss for its fire apparatus, foamite and sundry sales departments for the quarter ended March 31 of \$47,262. This compares with net profit of \$151,221 for the corresponding quarter of 1928. Commercial truck operations for the quarter show net loss of \$93,594 comparing with net loss of \$129,471 for the corresponding quarter last year.

Brockway Motor Truck Corp. and subsidiaries report net profit for 1928 after all charges of \$1,034,315. This is equivalent after preferred dividends to \$4.53 a share on outstanding stock and compares with \$1,209,554, or \$5.55 a share, on outstanding stock for 1927.

Raybestos Co. and subsidiaries report net profit for the first quarter of the current year after all charges as \$415,429. This is equivalent, after preferred dividends, to \$3.40 a share on outstanding \$25 par value stock, and compares with \$224,298, or \$1.78 a share, for the first quarter of 1928.

Stutz Motor Car Co. of America, Inc., reports net profit after all charges for the ten months ended Oct. 31, 1928, as \$245,878, or \$1.05 a share, on outstanding stock. This compares with net profit for the year ended Dec. 31, 1927, of \$195,831, or 84 cents a share.

Packard Motor Car Co. has declared monthly dividends of 25 cents each payable June 29 to holders of record June 12, July 31 to holders of record July 12 and August 31 to holders of record Aug. 12, respectively.

Aviation Corp. has acquired control of Southern Air Transport, Inc., and its six subsidiaries, adding 1378 miles of passenger and 1687 miles of contract mail routes to its already wide network of aerial transport lines.

Mack Trucks, Inc., reports net profit for the first quarter, after all charges, of \$1,429,587. This is equivalent to \$1.89 a share and compares with \$745,672, or \$1.01 a share, for the first quarter of 1928.

City Machine & Tool Co. reports earnings as \$121,134, equal to 80 cents a share on outstanding common in first quarter, compared to \$75,906 or 50 cents a share in same period last year.

Aero Supply & Mfg. Co. has declared three deferred dividends of 37½ cents each on Class A stock for the 1927-28 period, and regular quarterly dividend of 37½ cents.

Western Auto Supply Co. has declared regular quarterly dividend of 75 cents on Class A and Class B stocks, respectively, both payable June 1 to holders of record May 20.

Pines Winterfront Co. has declared an initial quarterly dividend of 25 cents on new stock issue and a new stock dividend of 2 per cent, both payable June 1 to holders of record May 15.

National Air Transport, Inc., reports net profit for the first quarter of the current year of \$120,626 as compared with a deficit for the corresponding period of 1928 of \$82,692.

Stinson Aircraft Corp. reports net sales for April of \$153,004, compared with \$66,278 for the corresponding month of last year.

Automotive Demand for Hardwood Steady; Prices Show Upward Trend as Stock Declines

ATLANTA, May 14—Although southern hardwood output of mills in this district has been seriously interfered with the past few weeks by rainy weather, wholesalers and manufacturers state there has been no abatement in the demand from the automobile and body factories, which continue to be the heaviest buyers of southern hardwoods as they have been ever since the early part of this year.

The lack of activity at the mills, however, and the fact that both orders and shipments are well in excess of production, has served to greatly reduce the available stocks on hand in the mill yards, and where orders are placed asking immediate shipment mills find them difficult to fill, especially when the orders specify dry lumber. Prices for the past few weeks have been showing a rather steady trend upward, and present quotations are higher than

those prevailing early in the year.

The primary demand at present is for the best grades of white ash in the thicker dimensions, with a fairly brisk call for the thicker dimensions of the second best grade, and some call for maple and elm. A number of orders are also being placed for sap gum, mainly best grades, with a few orders reported for the second best grade.

The automobile and body industries comprise about the only consumer of southern hardwoods placing any advance orders to speak of, and quite a few such orders have been recently reported by mills in this section for deferred shipment, to take care of the needs of the body factories for the third quarter.

There is now but little doubt that a new record will be established for the first half of 1929 as regards sales of southern hardwoods to this industry.

Cincinnati April Sales Show 46 Per Cent Gain

CINCINNATI, May 13—Automobile sales in Hamilton County in April showed a 43 per cent increase over March and a 46.7 per cent jump as compared with April, 1928. Registrations last month were 3274 as against 2283 in March and 2232 in April last year. Used car registrations showed an increase of 18.8 per cent last month over March and a gain of 30 per cent over April a year ago. March was a record month with several local dealers and the gratifying conditions existing in April have given rise to the conviction that the present year will establish a new high mark for this territory.

That there is no indication of a let-up is shown in the fact that sales for the first six days of the present month, as compared with the same period in April, reveal an increase of 13.2 per cent, or actual sales of 636 and 562, respectively.

Graham Adds Equipment

DETROIT, May 11—Graham-Paige has added spring covers to the standard equipment of its Model 615 (6-cylinder, 115 in. wheelbase), with no change in price. Spring covers have been factory equipment on the larger six and both eights ever since their introduction last January.

Rubber Imports Increase

NEW YORK, May 13—Arrivals of crude rubber into the United States during April were 54,171 tons as compared with 37,240 tons for the same month last year, according to statistics compiled by the Rubber Manufacturers Association, Inc. Total importations for the first four months of the year were 224,838 tons as compared with

153,822 tons for the corresponding period last year.

London prices of crude rubber advanced somewhat last week on speculative activity based on rumors of larger American consumption for April than preliminary estimates, according to F. R. Henderson Corp. The advance was not very strongly sustained in this market as large sellers continued their offerings. The London activity was not entirely speculative, according to the Henderson company, as substantial quantities were taken from the market for local and American consumption.

International Harvester Plans \$500,000 Building

MOLINE, ILL., May 13—The International Harvester Co., which recently announced plans for expansion of its Farmall tractor plant in Rock Island, will begin work immediately upon the second huge warehouse on its East Moline tract, according to H. M. Ross, Chicago district sales manager. No details of the building have been officially announced but it is expected it will exceed \$500,000 in cost, and will be slightly larger than the first one, which is nearly five blocks long and a block wide.

The warehouse will be on the 83-acre tract which International Harvester holds in East Moline at the foot of Fourth St. It will be of steel and concrete construction, increasing the company's investment in that city to more than \$1,500,000 and giving it a floor space of a total of 1,000,000 sq. ft.

Marmon Has 7287 Orders

INDIANAPOLIS, May 13—G. M. Williams, president of the Marmon Motor Car Co., today announced that orders for May shipment on the com-

pany's books total 7287 Marmon Models 68 and 78 and Roosevelt cars, indicating that shipments this month will compare favorably with the company's record total of 6029 established in April.

Schlee-Brock Contracts for Lockheed Airplanes

LOS ANGELES, May 13—The Lockheed Aircraft Co. has contracted to deliver the entire output of its factory for a period of one year to the Schlee-Brock Aircraft Corp. of Detroit. The contract involves airplanes worth \$3,000,000. It is claimed that this is the largest airplane order ever made, other than with the government.

Beginning this month and extending until May 1, 1930, the Detroit purchasers will take a minimum of 16 Lockheed planes per month. The total minimum under the contract is 200 planes. This contract requires that the Lockheed company immediately expand its manufacturing facilities. A double shift order has already been put in effect.

Smith Welding Builds

MINNEAPOLIS, May 13—The Smith Welding Equipment Corp., of this city, has awarded the contract for the construction of a two-story addition to its plant, which will provide for 14,000 sq. ft. The addition, which marks the second expansion of the company in six months, is to be ready for use in June.

Whippet Prices Increased

TOLEDO, May 11—Increases of \$15 and \$20 have been made on the 96-A line of the Whippet Four. New prices and amounts of increases follow: touring, \$495, increase \$20; roadster \$500, \$15; two-passenger coupe, \$550, \$15; five-passenger coach, \$550, \$15; five-passenger, four-door sedan \$615, \$20.

Plans Made for Merger

NEW YORK, May 11—Negotiations for the merger of Raybestos Co., the Manhattan Rubber Mfg. Co. and the United States Asbestos Co. were completed late this week. The merger will be carried out through an exchange of common stocks, exact details of which are not yet announced.

Industrial Tractors Increase

WASHINGTON, May 16—April shipments of electric industrial trucks and tractors, as reported to the Department of Commerce this week by the 11 leading manufacturers were 194, as compared with 211 in March and 136 in April, 1929, it was announced.

Equipment Plant Opened

TORONTO, May 13—The Service Station Equipment Co., Ltd., Toronto, has opened a new factory in Winnipeg.

Chicago Sales Gain

CHICAGO, May 11—April registrations of new cars in Cook County, Chicago, totaled 14,669, a gain of 66 per cent over the same month in 1928.

Crosley to Build Complete Airplane

Company Being Formed to Construct Three-Place, Parasol Type

CINCINNATI, May 13—M. O. Griffith formerly test engineer at the McCook and Wright government aviation fields at Dayton, Ohio, will join the new company being organized by Powell Crosley, Jr., president of the Crosley Radio Corp., to build airplanes in Cincinnati, according to an announcement by Mr. Crosley.

Griffith's appointment confirms the recent report that Mr. Crosley intends to build engines in his new plant, the later statement naming Mr. Griffith as chief in charge of engine design. No official announcement of the personnel or plans of the new company have yet been made other than that it will be entirely separate from the radio concern. It is understood that the company will undertake the manufacture of the Moonbeam, a 110 hp. parasol type monoplane, a model of which has been built under the direction of Mr. Crosley and Alfred Marks and proved successful in preliminary tests.

The Moonbeam is a three-place open plane equipped with a Warner Scarab engine, and designed by Prof. E. A. Stalker, head of the aeronautics department of the University of Michigan. The engine has seven cylinders, and the plane has a wing spread of 40 ft., with an overall length of 25 ft., 9 in. Quick pickup and low landing speed are cited as features.

It is expected that the present engine will be used temporarily, but that engine experiments will be carried on with the idea of eventually building a complete plane under Crosley auspices. In the latter connection it is said that the airplane enterprise will be entirely divorced from the Crosley radio interests.

Belgian Firm to Build

BERLIN, May 6—The Belgian FN Works (National Arms Works, Herstal, near Liege) has concluded an agreement with the city of Aachen (Aix-la-Chapelle) Germany, whereby it will receive a large factory site from the municipality on which an automobile and motorcycle factory will be erected. Building operations are to begin at once, and it is expected to complete the plant in the course of the current year. Engines are to be imported from Belgium.

Soucek Sets Record

WASHINGTON, May 11—The Bureau of Standards reported yesterday that Lieut. Apollo Soucek, the naval aviator, reached an altitude of 39,140 ft., creating a new world record, and exceeding by 722 ft. the record of 38,418 ft. set by Lieut. C. C. Champion in 1927. An official report of the record, includ-

Eight Cars to Mile in Madeira Islands

WASHINGTON, May 16—There are at least eight automobiles for every mile of improved highway in the Madeira Islands, according to a report made this week to the Department of Commerce by John M. Lord, Vice-consul, Funchal, Madeira. Since 1907, 951 motor vehicles have been imported and it is estimated that 750 are now in use. There are less than 90 miles of highway suitable for automobile traffic.

ing data on the type of plane, the Wasp engine and the Roots supercharger, is to be forwarded by the Aeronautic Association to the Federation Aeronautique Internationale at Paris. It was revealed today that the supercharger, employed to reproduce ground atmospheric conditions in the engine at high altitudes, was developed at Langley Field, Va.

Goodrich Lets Contracts for Textile Mill in Ga.

ATLANTA, May 13—The B. F. Goodrich Rubber Co. has awarded all contracts for the large textile mill project the company is now carrying out at Thomaston, Ga., where its facilities for the manufacture of fabric for use in making automobile tires are being enlarged.

The Goodrich company is also contemplating the construction of a new plant for the manufacture of automobile tires in Atlanta to cost approximately \$1,500,000, the site for which was purchased some months ago. Capacity of the new Atlanta plant is to be not less than 5000 tires and 5000 tubes per day, officials of the company have stated.

Goodyear Buys Mills

CARTERSVILLE, GA., May 13—Clifton C. Slusser, vice-president of the Goodyear Tire & Rubber Co., Akron, has announced the purchase of the properties of the American Textile Co., here, at a cost estimated at about \$5,000,000. The company will immediately launch an expansion program, with an investment of \$1,000,000 improving and enlarging the mills. The Atco Mills, as they have been known here, have been producing fabric for the Goodyear company for the past year.

Rim Output Increases

CLEVELAND, May 13—Rim production in April advanced to a total of 2,729,899, compared with 2,613,389 in March and 2,316,906 in April, 1928, according to the statement of rims approved by the Tire and Rim Association of America, Inc. The total of the first four months of 1929 was 9,443,519, compared with 8,354,379 in the corresponding period of 1928.

Shipments of Tires Increase in March

Rubber Association's Report Shows Greater Output and Heavier Stocks

NEW YORK, May 13—Heavier production schedules throughout March resulted in increased inventories of all types of tires in spite of generally increased shipments, according to the statistical bulletin of Rubber Association of America, Inc., which represents approximately 75 per cent of that industry in the United States.

This is generally true not only as regards comparison with the previous month but also in comparison with the corresponding month of last year. This latter fact applies particularly to balloon casings and inner tubes, inventory, production and shipments of high pressure tires being in all cases lower than they were last year but higher than in the previous month.

Comparative figures follow:

PNEUMATIC CASINGS—ALL TYPES

	Inven- tory	Produc- tion	Ship- ments
Mar. 1929...	12,263,816	5,639,426	5,031,101
Feb. 1929...	11,620,960	5,183,693	3,961,751
Mar. 1928...	9,291,516	5,113,994	4,298,551

INNER TUBES—ALL TYPES

Mar. 1929...	13,312,636	5,999,787	5,053,266
Feb. 1929...	12,749,141	5,076,855	3,958,257
Mar. 1928...	11,854,534	5,423,255	4,298,504

BALLOON CASINGS

Mar. 1929...	7,358,642	4,229,586	3,863,650
Feb. 1929...	7,472,592	3,796,660	2,976,698
Mar. 1928...	4,700,534	3,516,480	2,967,476

BALLOON INNER TUBES

Mar. 1929...	7,938,587	4,120,493	3,773,585
Feb. 1929...	7,572,752	3,675,116	2,908,406
Mar. 1928...	5,782,551	3,683,017	2,856,342

HIGH PRESSURE CORD CASINGS

Mar. 1929...	4,330,747	1,397,657	1,157,188
Feb. 1929...	4,073,644	1,373,691	974,185
Mar. 1928...	4,355,309	1,564,346	1,302,644

HIGH PRESSURE INNER TUBES

Mar. 1929...	5,356,289	1,475,822	1,276,490
Feb. 1929...	5,159,171	1,398,156	1,046,042
Mar. 1928...	6,071,983	1,740,238	1,442,162

Report Shows U. S. Gain in Exports to France

WASHINGTON, May 16—The United States supplied 45 per cent of the total number of passenger cars and 52 per cent of the total number of trucks imported into France during 1928, according to figures made public by the Department of Commerce this week.

France imported 9587 passenger cars and trucks last year, an increase of 4360, or 84 per cent over the 1927 imports. Of the 9266 passenger cars imported, 4157 came from the United States. Of the 321 trucks imported, 170 came from the United States.

On the other hand French automotive exports declined 15 per cent last year.

Qualifying Trials for Race Arranged

INDIANAPOLIS, May 14—The qualifying trials, to decide the 33 cars which will be permitted to start in the Grand Prize of America on May 30, will begin on Saturday, May 25. Forty-six cars have been nominated, but the American Automobile Association, the governing body of the event, has ruled that there be a car for every 400 ft. of track.

The fastest car at the trials is to be awarded the pole position, and the other cars qualifying will line up in rows of three, according to speed. As an award for being ready early, the cars which qualify on the first day are to be given starting precedence over those qualifying on May 26, 27 and 28.

Racing experts have expressed the belief that the 33d car in the race will have an average of more than 100 m.p.h. The record lap at Indianapolis is held by Leon Duray, who drove the course at a pace of 124.018 m.p.h. He also holds the four-lap qualifying record at 122 m.p.h.

Thunderbird Assets Bought

LOS ANGELES, May 13—The assets of the Thunderbird Aircraft Co., which went into bankruptcy here last year, have been bought in at bankrupt sale by a group of Los Angeles business men, most of whom have previously been financially interested in other airplane ventures. Names of those identified with the purchase have not been announced.

Battery Plant Established

ATLANTA, May 14—The Power Battery Mfg. Co., formed recently at La Grange, Ga., by W. S. Power, R. H. Teat, Claude Hammett and others, has established a plant in that city for the manufacture of batteries, specializing

New Zealand Adds Canadian Imports

WASHINGTON, May 16—New Zealand's imports of automobiles from Canada in March numbered 870 as compared with 48 bought in the same month a year ago, according to the Department of Commerce. Total automobile imports into New Zealand during March numbered 1953 as compared with 1438 cars in the same month last year.

in the making of those for use in automobiles. Mr. Power has for the past 15 years been actively identified with this business with the Stewart Battery Co., Inc., and the A. F. Schuberth Co., both of Chicago.

Equipment Combine Assured

NEW YORK, May 14—Sufficient stock in Moto Meter Co. and in Safe-T-Stat Co. has been deposited for the completion of the merger to organize Moto Meter Gauge & Equipment Co., according to announcement made by the committee in charge of stock deposit. However, in order not to penalize those who failed to deposit their stock this week, the time allowed for this deposit has been extended until the close of business May 23.

Equipment Makers Invited

WASHINGTON, May 16—Manufacturers of equipment for railroads, roads, automobiles, trucks and tractors are among those invited to exhibit their products at the International Railroad and Road Exposition to be held at Santiago, Chile, from Dec. 10 to 31, 1929, according to an announcement by the Department of Commerce.

New Rubber Group Formed by Merger

NEW YORK, May 11—The Rubber Association of America, Inc., at a special meeting held yesterday changed its name to the Rubber Manufacturers Association, Inc., and determined to limit members to firms, corporations and individuals directly engaged in the manufacture of rubber products in the United States.

The Rubber Institute, Inc., also held a special meeting at which it was voted to dissolve the Institute and to turn unfinished business as of the time of dissolution over to the Rubber Manufacturers Association.

These two actions were taken as the final step in the merging of these two bodies and the dissolution of the Institute was considered the most feasible method of transferring its activities to the new association. The Rubber Manufacturers Association will continue the cooperative work developed by the Rubber Association over a period of years in all branches of the industry.

Gray Left \$500,000

OTTAWA, May 11—The will of the late Robert Gray, president of the former Gray-Dort Automobile Co., Chatham, Ontario, manufacturer of Dort cars in Canada for a number of years, has been filed for probate and discloses an estate of approximately \$500,000, apart from the interest which he held in the company. Only \$20,000 is in real estate, this being the Gray residence at Chatham.

Lamp Firms Combine

LOS ANGELES, May 11—Purchase of Charles Kaufman & Sons Co. of Santa Ana, Calif., manufacturer of the Silverbeam line of automobile spotlights, has been announced by the S. & M. Lamp Co. of Los Angeles.

Calendar of Coming Events

SHOWS

International Aircraft Exhibition, Olympia, London July 16-27
International Aircraft Exhibit, Coliseum, Chicago Sept. 7-15
National Machine Tool Builders' Exposition and Congress, Cleveland, Sept. 30-Oct. 4
Paris, Automobiles Oct. 3-13
London, Automobiles Oct. 17-26
Prague, Automobiles Oct. 23-30
Paris, Motorcycles Oct. 23-Nov. 3
M.&E.A. Show and Convention, Chicago Nov. 4-9
N.S.P.A. Show and Convention, Detroit Nov. 11-16
Berlin Auto Salon Nov. 14
London, Trucks Nov. 7-16
Paris, Trucks Nov. 14-24
London, Motorcycles Nov. 30-Dec. 7
Brussels Auto Salon Dec. 7
New York National Jan. 4-11
Chicago National, Coliseum Jan. 25-Feb. 1

CONVENTIONS

American Iron & Steel Institute, General Meeting, New York May 24
A.S.M.E. Aeronautic Meeting, St. Louis, May 27-30

Joint Meeting, Oil and Gas Power Division of the American Society of Mechanical Engineers and Pennsylvania State College, State College, Pa. June 24-27
American Society Testing Materials, Annual Meeting, Atlantic City, June 24-28
American Welding Society, Fall Meeting and Exposition, Cleveland Sept. 9-12
American Institute of Mining and Metallurgical Engineers, Cleveland, Sept. 9-12
American Society for Steel Treating, Convention and Exposition, Cleveland Sept. 9-13
A.S.M.E.—Iron and Steel Division—National Meeting, Cleveland Sept. 11-13
Society for Electrical Development, New York City Sept. 13
Eastern States Exposition, Springfield, Mass. Sept. 15-21
American Electric Railway Association, Atlantic City Sept. 23-Oct. 4
National Machine Tool Builders' Association, Cleveland Sept. 30-Oct. 4
National Safety Congress, Annual, Chicago Sept. 30-Oct. 4
Society of Industrial Engineers, Detroit Oct. 16-18
World Engineering Congress, Tokyo, Japan Oct. 29-Nov. 22

RACES

Gardner Trophy (Aircraft), St. Louis, May 23-30
Indianapolis May 30
Detroit June 9
Altoona, Pa. June 15
Rudge Whitworth Cup, Le Mans, June 15-16
Salem, N. H. June 29
French Grand Prix June 30
Spanish Grand Prix July 31
British Tourist Trophy Race Aug. 17
Akron Aug. 18
National Air Races and Show, Cleveland, Aug. 24-Sept. 2
European Grand Prix, Italy Sept. 8
Syracuse Aug. 31
Altoona, Pa. Sept. 2
Cleveland Sept. 15
Salem, N. H. Oct. 12

S. A. E.

Summer Meeting, Saranac Lake June 25-29
Aeronautic Meeting, Cleveland Aug. 26-28
Production Meeting, Cleveland Oct. 2-4
Annual Meeting, Detroit Jan. 21-24

Sectional

New England May 22
Metropolitan " 23